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ABSTRACT

A survey was undertaken to discover reasons for the failure of the average Negro premedical student to reach the fifteenth percentile on medical aptitude tests. Curriculum offerings, personnel, physical facilities and equipment for administering a premedical program at 15 accredited colleges are examined. In addition, an analysis is provided of information contributory to an explanation for the low level of achievement of Negro students on the medical aptitude tests other than the known inadequate backgrounds and foundations. Such factors include: (1) the status and attitudes of science teachers; (2) the organization of the sciences in the colleges surveyed; (3) duties, responsibilities, and authorities of department chairmen; (4) appointment of personnel; (5) science instruction in the colleges surveyed; (6) teaching loads; (7) turnover of science personnel; and (8) opportunities for professional growth. (SPG)

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Educ. for Health Prof. — Negro Education.

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PREMEDICAL EDUCATION FOR NEGROES:

Interpretations and Recommendations Based Upon a Survey in Fifteen Selected Negro Colleges

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By

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(1949)

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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FOREWORD

This is a report which has long been needed. Most people concerned with the problems of health in this country are, of course, fully aware that the ratio of Negro physicians to the Negro population is many times lower than the ratio of white doctors to the white population. Equally well understood are two of the major reasons for this disparity--lack of openings in medical schools for Negro students and the adverse conditions under which a Negro doctor must practice once he has received his degree. But Dr. Buggs has gone further into the problem. In this study sponsored by the Office of Education of the Federal Security Agency he has explored the condition of premedical education in Negro colleges and has come up with a mass of factual data which, for many people, may throw an entirely new light on the situation.

Certainly, this report makes it abundantly clear that, in terms of basic preparation, the average Negro seeking to enter the medical profession is at a distinct disadvantage as compared with the average white student. With the educational standards of the typical Negro college far below those of the white college, only a tiny percentage of students enrolled in the premedical courses are able to meet the entrance requirements of the medical training schools; and those who do succeed in entering the non-segregated schools find themselves, almost without exception, in the lower half of the examination ratings.

Dr. Buggs takes up, point by point, the inadequate teaching in these courses--the lack of adequate professional staff, the pathetic lack of even basic laboratory facilities and equipment, and the administrative and financial difficulties of these colleges. He lays emphasis on the high cost of medical training which bars many qualified young Negroes from becoming doctors, but he also underscores the psychological effect on the Negro, in approach to the study of medicine, of his entire economic and cultural background.

In other words, Dr. Buggs tells us once again that the old tragic factors of poverty and lack of equal opportunity, which are at the heart of the whole Negro problem, continue to dog us at every step of the way in our efforts to secure the number of trained Negro medical personnel which the Nation so desperately needs.

Some day--and I hope it will be soon--the Negro in this country will be given an even break. In the meantime such reports as this are invaluable in drawing the line of battle against those forces which now make this impossible.

Oscar R. Ewing

Federal Security Administrator

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PART I

Status of the Negro Premedical Student and the Genesis of the Survey

1. *Present Situation in Medical Education With Reference to Negroes and Genesis of the Survey*

The shortage of Negro physicians is generally known and felt throughout the country. In 1942 there was only one Negro physician to every 3,377 Negroes in the general population, whereas the national ratio was 1 to 750. The ratio for a minimal standard of safety is placed at 1 to 1500.* There are five times as many white doctors in proportion to the white population as there are Negro doctors in proportion to the Negro population, the range being from twice as many in Missouri to twenty-two times as many in Mississippi.

The acute shortage of Negro physicians may be traced, primarily, to three factors: (1) the inability of the two medical colleges for Negroes to accommodate a combined enrollment of more than approximately 140 new students per year; (2) apparent weaknesses in the educational programs of the typical accredited Negro college as revealed by the relatively poor showing of its students on standard tests of medical aptitude and scholastic achievement; and (3) the resultant inability of premedical students in Negro colleges to compete successfully with white students for admission to Northern and Western medical schools which maintain no color bar.

In order to clarify to what extent the inability of Negroes to qualify for admission to American medical schools was due to the type of premedical preparation given by Negro colleges, an approach was made to officials of the Rockefeller Foundation in January, 1947, to ascertain their interest in providing financial support for a conference to be set up for the purpose of discussing this problem. Later, the problem was discussed with officials of the Julius Rosenwald Foundation, the Provident Medical Associates, and the Federal Security Agency.

With funds provided by the Rockefeller Foundation, a conference was called jointly by President Rufus E. Clement of Atlanta University and President A. W. Dent of Dillard University at Atlanta University on April 22 and 23, 1948. The following persons were present: Dr. Will W. Alexander, Julius Rosenwald Fund; Dr. Paul Beeson, Emory University School of Medicine; Dean Michael J. Bent, Meharry Medical College; Dr. Eugene H. Dibble, Tuskegee Institute; Dr. Charles R. Drew, Howard University College of Medicine; President William H. Gray, Florida A & M College; Dr. Roderick Heffron, Commonwealth Fund; Dr. Martin Jenkins, Howard University; President Charles S. Johnson, Fisk University; Dr. J. A. C. Lattimore, President, National Medical Association; President Benjamin E. Mays, Morehouse College; Dean S. M. Nabrit, Atlanta University; Dr. Robert A. Moore, Washington University School of Medicine; Miss Mary E. Switzer, Assistant to the Administrator, Federal Security Agency; Mr. G. L. Washington, Tuskegee Institute; President Rufus E. Clement, Atlanta University; President Albert W. Dent, Dillard University; and Dr. Robert A. Lambert, Rockefeller Foundation.

*Cobb, W. Montague: Medical Care and the Plight of the Negro, pamphlet, NAACP, New York, 1947.

The conference[1] held in Atlanta had as its primary aim discussions of the problem of increasing the quality and number of Negro physicians. Its special interest, however lay in the problems involved in improving premedical education and specifically, of improving the quality of teaching in the Negro colleges of the United States. It was felt, however, that all aspects of the total problem should be understood so that the various forces in interested areas might be brought to bear upon them.

These aspects were outlined under four major divisions--

I Premedical Education

II Medical Education

III Graduate Medical Education

IV Postgraduate Medical Education

There are defects in each of these areas. Suggestions and recommendations which evolved from this conference are as follows:

Premedical Education

1. It was suggested that a special division of the Office of Education be set up to find at the high school level students of promise in scientific and medical fields, by establishing Nation-wide competitive examinations in the high schools of the country. The Office of Education, of course, did not commit itself to any such program; this was in the nature of a suggestion.

2. It was suggested that an attempt be made to find scholarship aid for these talented students to enable them to attend some college for premedical education. All educators agree that much of our best talent is lost at this stage. It was suggested that some independent agency might be in a position to sponsor scholarships for a certain number of carefully selected students at the college level.

3. It was recommended that a study be made of the present curriculum offerings in representative Negro schools, with the idea of evaluating the quality of teaching, the adequacy of equipment, and the basic philosophy concerning the preparation of students for professional careers in science and medicine.

4. It was further suggested that attempts might be made to obtain funds from certain foundations in order to set up what might be considered an almost ideal environment in which to prepare medical applicants for the rigid competition now existing. Some thought was given to the schools to be selected for this experiment; and it was felt that probably the best criterion would be the records of these schools with reference to the students they had sent to medical schools in the past.

5. It was recommended that the National Medical Association set up a central registry of students interested in entering medical school, so that there would be a continuous record of the flow of such students and a constant source of information concerning the availability of students for such educational opportunities, which from time to time show up. As an illustration of the need--from time to time there are

[1]This summary of the Atlanta conference was prepared by Dr. Charles R. Drew.

openings for Negroes in some of the major universities of the country, but there is no place from which information may be obtained concerning the availability of persons eligible to fill such appointments.

II Medical Education

It was the consensus of the group

1. That since there was such a desperate need for more well-trained medical personnel, the group express itself in favor of continuing Howard and Meharry Medical Schools, though the opinion of the great majority of the discussants was that the ideal situation would be a completely integrated medical educational program.

2. That an appeal be made to the forty-eight (48) Northern and Western universities, which have in the past accepted Negro students, to accept an increased number of qualified applicants as their share of the job which is so greatly needed.

3. That all possible effort be brought to bear on the twenty-seven (27) medical schools in the South which have never considered the acceptance of Negro students, in spite of the fact that it is in this area that the problem is greatest.

4. That an attempt be made to increase the over-all medical educational facilities in the United States and that each new facility be committed to a completely integrated program.

5. That every avenue for scholarship aid for needy medical students be explored; and that where Federal, State, and local scholarships are not available, there should be set up Federal, State, community, and university loans to enable top-flight medical students to continue their training.

III Graduate Medical Education

It was the opinion of the entire group

1. That every legal step be explored in order to assure increasing opportunities for graduate training of the residency type in municipal, State, and Federal hospitals. These institutions are supported by all of the people. Their facilities for both care and training should be made available to all of the people.

2. That the heads of various church organizations who control training hospital programs should be approached with the idea of pointing out to them the moral obligation which they have on the basis of their professed Christian principles to do away with the discriminatory practices toward Negro physicians and medical personnel.

3. That the boards of trustees of the principal teaching institutions be advised of the serious shortage of Negro personnel toward the end that they might broaden their policies and allow the inclusion of such personnel in the training programs of their institutions.

4. That opportunities for basic science training in areas other than in hospitals be explored with the idea of making available this phase of training.

IV Postgraduate Medical Education

It was felt by this group that no matter how well trained a young physician might be, if he is forced to practice in a community in which he has no possibility of continuing contacts with the principal streams of medical thought, he soon deteriorates. Postgraduate education, therefore, is a life-time job, and is carried out through means of attendance at the local hospitals, the local and State medical society meetings, and the great national medical and scientific societies. It was felt, therefore, that in this over-all program.

1. That effort should be made to have opened to the Negro physicians the extensive postgraduate opportunities presented by membership in associations such as the American Medical Association, from which the vast majority of Negro practitioners are barred, on the basis of their unacceptability to local or county societies.

2. That State-wide action be taken in each State to open up to all ethical practitioners membership in the State societies which do not now accept Negroes.

3. That an earnest effort be made through community organizations to have the local qualified Negro physicians made eligible for membership on staffs of local hospitals.

While all of these phases of the problem were discussed in some detail, it was felt that this group could do its best job by limiting itself to that phase which has to do with premedical education at the college level.

At the conclusion of the Atlanta Conference a committee composed of President Dent, as chairman, Dr. Nabrit and Dr. Bent, with President Clement and Dr. Lattimore as ex officio members, was asked to follow through as far as practicable the suggestions made by the Conference. The first step was to attempt a study of curriculum offerings, teaching personnel, and physical facilities in a selected group of colleges. Dr. Charles W. Buggs, then Associate Professor of Bacteriology in the Medical School of Wayne University, was invited to make the study. The U. S. Office of Education arranged for Dr. Buggs to be a part-time consultant for this purpose. The Rockefeller Foundation provided funds for the expenses of the Committee. In making the study Dr. Buggs had the counsel of a Survey Committee composed of Dr. S. M. Nabrit, Dean of the Graduate School of Atlanta University; Dr. Thomas Turner, now retired but formerly Professor of Biology at Hampton Institute; Dr. Lloyd E. Blauch, Associate Chief for Education in the Health Professions; Dr. Ambrose Caliver, Specialist in the Higher Education of Negroes; and Dr. John Dale Russell, Director of the Division of Higher Education, Office of Education, Federal Security Agency.

2 Status of the Negro Premedical Student--The Facts in the Case

Pertinent data on the achievement of Negro students on medical aptitude tests for the period 1932-1944 were accumulated in a comprehensive study made by the Committee on Premedical and Predental Education at Howard University.* This study was begun in 1945, and it included, besides the study of results from medical aptitude tests, a study of opinions of students and faculty in the professional schools and the opinions of practicing physicians with reference to various aspects of preprofessional and professional training. In 1948, Dean Michael J. Bent of Meharry Medical College completed a study of the grade-point

*This Committee was chairmaned by Dr. Herman R. Brasson, Professor of Physics, who kindly gave permission for the use of certain data from their study.

achievement of that college's freshman medical students with reference to the premedical colleges in which the students had received their training. This study covered the ten-year period between the academic years 1938-1939 and 1947-1948 and was directed specifically to the accumulation of data which would permit answers to the following questions:

"1. How do students from different Negro colleges compare with respect to grade-point averages in the first year of medicine?

"2. How do students from different colleges compare with respect to accumulative grade-point averages for the four years of medicine?

"3. How do students completing premedical work in all-Negro institutions compare with those from mixed institutions?

"4. How do students entering medicine who have earned advanced degrees compare with those who have only the first degree or less?"

The present Survey was undertaken with the specific objective of discovering reasons or possible reasons for the failure of the average Negro premedical student to reach the fiftieth percentile on the medical aptitude tests as brought out by the Howard Report. As a background to this study, it is essential that a brief summary be given of the Howard and Meharry findings.

The Howard Committee on Premedical and Predental Education secured the results from the medical aptitude tests that were taken by 1,951 students in forty regionally accredited Negro colleges. Of this number, 256 or 13.1% reached the fiftieth percentile or above. Otherwise stated, these results indicate that approximately eighty-seven percent of Negro premedical students, during the years 1932-1944, failed to reach the fiftieth percentile on the medical aptitude test. On the basis of expected accomplishment, 975 of these 1,951 students should have reached the fiftieth percentile or above. However, only 256, or approximately 26 percent of the expected number reached or exceeded this level; 585 students should have reached the seventieth percentile and higher -- only 105 achieved these levels or approximately eighteen percent of the expected number; 195 students should have achieved the ninetieth percentile and above--actually, twenty-seven reached the ninetieth percentile and above or approximately fourteen percent of the expected number. Three colleges in this group of forty contributed a total of 850 students who participated in the medical aptitude testing program. When the accomplishments of these students were compared with expected accomplishments, it was found that these three major sources of premedical students produced only about one-fifth as many students who reached the fiftieth percentile or above as would be expected from an average American college.

The Meharry Report dealt specifically with medical school matriculants at Meharry, and the various data pertaining to these students were analyzed as previously mentioned. The study involved a total of 639 freshman students who presented evidence of having attended 146 different colleges and universities. Working with the means of the grade-point averages for the freshman year (straight "A," 272 points, straight "B," 204 points; straight "C," 136 points), it was found that the mean for those students who had completed all of their premedical work in a single Negro college was 169.1 with a S. D. of ±34.2. The students who had attended more than one Negro institution had a mean grade-point average of 168.8 with a S. D. of ±40.3. Students who held advanced degrees had a mean grade-point average of 189.9 with a S. D. of ±49.8. The difference between the mean grade-point average earned by students who attended Negro institutions and the mean grade-point average of students who attended mixed institutions is statistically significant.

When the total grade-point averages for the four years were considered (1,088 points for a straight "A" average), the students from only two of the forty-eight Negro colleges in the study scored an average above 721 points (177 points above a straight "C" average and 95 points below a straight "B" average). The students (seven in number) from one of these colleges scored an average of 812.6 grade points while the students (five in number) from the second college scored an average of 721.4 grade points. The students from six additional colleges scored an average above 700 grade points, but less than 721.4, while the students from the remaining forty colleges scored an average below 600 grade points on their four years of medical study. An analysis of the Meharry Report shows that each of thirty-six of the forty-eight colleges supplied seven or less students, seven of the colleges supplied from eight to fourteen students each, while only five of the colleges supplied more than fourteen students each.

The conclusions drawn by Dean Bent were:

"1. That many of the best students entering medicine are selected from the small colleges. Though these colleges have fewer students selected than some of the larger institutions, they rank higher in student achievement during the freshman and subsequent years than students from many of the larger institutions.

"2. That the achievement during the freshman year in medicine is a good indication of the achievement students will attain for the four years of medical training.

"3. That the average achievement of freshman students indicates that many did not possess the academic ability to effectively pursue medical training. The mean grade-point average for the total group of students is slightly over 60 per cent of the possible total grade-point score.

"4. That students from mixed colleges excel those from all-Negro colleges in total grade-point averages for the freshman year.

"5. That students with advanced degrees perform better in grade-points during the freshman year of medicine than those students with A.B. degrees or less."

One comment should be made concerning data from the Meharry Report. It has to do with the increment in achievement of students with advanced degrees as compared with the achievement of students with only the bachelor's degree received from a mixed institution. It would appear that, on the average, the extra preparation above the bachelor's degree did not add materially to the achievement of those students since they were successful in accumulating only 7.1 more grade points than the students with only the A.B. degree. If a student has mastered his tool subjects, has developed effective study habits, has the requisite intelligence and is properly inspired and motivated so that he applies himself to his studies, his medical career as a student will be reasonably assured without over-concentration in the sciences or an advanced degree.

3. Factors Contributory to the Inadequacies of the Negro Freshman Student

In seeking explanations for the low level of scholastic achievement of the average Negro student, the socio-economic background of these students must be given primary consideration. The following statements, obtained from the Fisk University study of its premedical program,* adequately give this background.

*Grateful acknowledgement is made to Dr. George N. Redd and the members of his committee at Fisk University for permission to incorporate, verbatim, in this report the section on "Conditional Factors" from their report on "PRE-MEDICAL EDUCATION AT FISK UNIVERSITY." The members of this committee were Drs. Redd, Chairman, A. A. Taylor, St. Elmo Brady, Harry T. Folger, and James R. Lawson.

"The deficiencies revealed in the performance of Negro students on standard tests of professional aptitude and achievement are a direct outgrowth of certain persistently unfavorable conditions under which the basic education of these students was obtained. The typical student who was graduated from a Negro college in the spring of 1948 began his formal education approximately sixteen years ago, when he entered the first grade of a segregated public school in the South. This was during the years 1931 and 1932. At this time, Negro education in the South was at a low ebb on many counts. Considerable retardation prevailed in Negro schools. Eighty-two percent of the enrollment in the elementary schools was concentrated in the first five grades; and only 1.6 percent in the eighth grade. The average school term for Negro schools was 132 days or six and one-half months; whereas, the same for whites was 162 days or eight months.

"The teaching staff of the Negro schools in the South comprised approximately 47,426 persons. Of this number, 18,130 had achieved less than high school training; and 9,431 less than two years of college training. Many of these teachers taught excessively large classes with very inadequate equipment. Salaries were too low to provide a decent living to say nothing about opportunities for professional growth and development.

"Thus, when the student who survived eight years of elementary schooling under these conditions entered high school, he did so with many inadequacies in his basic preparation. He faced a further handicap at the outset of his high school career, because secondary education for Negroes was far below standard. There existed the same deficiencies in teacher qualifications, in classroom instruction, and in equipment which characterized his education on the elementary level. The process of intellectual retardation which persisted throughout the elementary school was continued through four years of secondary schooling.

"Upon entering college around 1944, this typical student entered at a level of achievement far below that of the average freshman in American colleges. His difficulties were compounded by virtue of the fact that the college which he attended was not adequately equipped to provide for him the kind of guidance and individual attention needed to overcome these background deficiencies. In 1944, the average Negro college both public and private, operated on a dangerously low budget. Due to the war, many adjustments had to be made in staff, services, and equipment which were detrimental to educational standards. To illustrate, of all the money expended for higher education during that year, Negro colleges accounted for just slightly more than eight percent. Under these limitations, it was impossible to provide those fundamental essentials of higher education which are conducive to effective teaching and learning.

"As a result of the situation described in the foregoing paragraph, the 1948 graduate of the typical Negro college left his institution decidedly handicapped in competition with the white student for places in the graduate and professional schools of the nation."

4. Purposes of the Survey

It was the consensus of the Survey Committee that two main bodies of information were desired--first, a check of curriculum offerings, personnel, physical facilities and equipment for administering a premedical program; and second, if possible, information contributory to an explanation for the low level of achievement of Negro students on the Medical Aptitude Test other than the known inadequate backgrounds and foundations as given in the previous section. In addition to the data to be collected, it was the purpose of the Survey group to prepare a statement on "Educational Requirements for Those Planning

to Study Medicine." In the absence of complete and specific information, it was felt that schools in general lacked a formal statement of these requirements and were guided in the formulation of their curricula mainly by the academic requirements set up by the Association of American Medical Colleges. These requirements by no means are sufficiently stated to serve as a guide for formulating a curriculum which meets the needs of the present-day premedical student. Dr. S. M. Nabrit was given the responsibility for preparing the statement of educational requirements for the study of medicine.

5. Selection of the Schools Surveyed

Only colleges accredited by their regional accrediting association were included in the Survey, and of these, two groups were selected--five tax-supported and ten privately owned schools. The selection was based upon the number of students from each regionally accredited college that had matriculated at the College of Medicine at Howard University and Meharry Medical College during the ten-year period 1938-1947. Tabulations of the distribution of freshman medical students, on the basis of the schools in which their premedical education was obtained, were supplied by the two medical colleges. From these combined tabulations the five highest-ranking tax-supported colleges and the ten highest-ranking privately owned colleges were chosen.

PART II

Educational Requirements for Those Planning to Study Medicine

Medical education is designed to train two groups of students: a smaller basic scientific group, interested in medical research and instruction, and a much larger group of physicians who apply the techniques and findings of science in the art of treating and healing the physical and mental diseases of mankind.

There is no special premedical course of instruction guaranteed to lead to success in gaining entrance into medical schools. The term premedical in this connection is a misnomer in as much as the minimum and the best preparations for medicine are not too different from the requirements for intelligent living and an understanding of the interplay of forces of modern society.

1. Quantity and Quality of Premedical Work

The quantity and quality of premedical education have changed with the advances and shifts of emphasis in medicine itself. Prior to 1918 a college preparation for admission to medical school was not required. From 1918 to 1938 two years of college work, including specified courses, were required. Seventy-five of eighty-seven schools now require three years of college work. With the exception of California, the State licensing boards, by statute in the majority of instances, require that an applicant for licensure must present evidence of having completed two years of college. In practice, only the most apt and most intellectual students are admitted after the minimum training, and, in general, the competition is so keen that an applicant with a bachelor's degree is more successful in gaining admittance to medical schools.

a. Minimum college preparation.- There appears to be general agreement as to the minimum college preparation necessary for the study of medicine. Stated quantitatively by the Association of American Medical Colleges and the Council on Medical Education and Hospitals of the American Medical Association, the requirements are as follows:

	Lecture Hours	Laboratory Hours	Semester Hours
Chemistry			
General Inorganic (with or without qualitative analysis)	4	4	8
Organic	2	2	4
Physics	6	2	8
Biology	4	4	8
English Composition and Literature			6
Electives			26
		Total	60

b. Ranking of students in medicine.- Dr. Fred C. Zapffe, for many years and until quite recently, Secretary of the Association of American Medical Colleges, has pointed out that a ten-year study of the scholastic achievement of medical students indicated that the ranking of students in medicine was as follows: first, those holding the bachelor of arts degree; second, the three-year men; third, the two-year men; and fourth, those holding the bachelor of science degree. Heavy concentration in the sciences at the expense of a broader, more liberal education is therefore undesirable. Some colleges require as much as ninety hours to compensate for lack of thorough training in science, humanities and social studies in so-called premedical programs.

c. Requirements of medical schools. - Study of the catalogs of several of the medical schools reveals that there is no unanimity concerning required advanced courses in science or recommended courses among science electives. Iowa and Michigan (class of 1950) require a course in vertebrate embryology. Meharry's committee is favorably inclined toward students who have had embryology, comparative anatomy and anatomy of the nervous system. Harvard definitely recommends vertebrate embryology. Pennsylvania suggests that comparative anatomy and embryology may be helpful, but due to the shift of emphasis from structure to function, strongly recommends general physiology.

Most medical schools consider it unwise for students to elect bacteriology, histology, or neurology prior to medical school entrance.

Among the advanced courses required or recommended are: physical chemistry, biophysics or advanced physics, and calculus. Usually only one advanced course from one science area is required. Quantity of offering is not so desirable as quality.

The medical schools in the Chicago area require a "B" average for consideration. Michigan requires 90 hours and 135 quality points. This amounts to a "C" average with no grade below "C" in the required sciences. Grades cannot be readily compared. Schools, teachers, and regions vary in grading. "C" students with broad and thorough basic education frequently excel the "B" students heavily concentrated in the sciences. One attempt to evaluate the grading of students is to require the Graduate Record Examination in addition to a medical aptitude test.

2. Medical College Admission Test

It may be stated here, for purposes of clarification, that the Moss Medical Aptitude Test was discontinued by the Association of American Medical Colleges on August 31, 1946. The medical aptitude testing program of the Association was administered by the Graduate Record Office of the Carnegie Foundation for the Advancement of Teaching during the academic years 1946-1947 and 1947-1948, and the test was known as The Professional Aptitude Test. The test now taken by premedical students is administered by the Educational Testing Service and is known as the Medical College Admission Test. The general form of the individual tests in the Medical College Admission Test is the same as that in the previously used Professional Aptitude Test. The areas over which the student is tested are

General Ability

Verbal ability (vocabulary and comprehension) — 105 minutes

I Social Materials
II Scientific Materials

III Humanistic Materials

Quantitative Ability	60 minutes
Achievement	
Premedical Sciences	90 minutes
Understanding of Modern Society	90 minutes

3. Graduate Record Examination

In addition to the Medical College Admission Test, a Graduate Record Examination is required by a small number of medical schools. The Graduate Record Examination includes a general profile test in mathematics, physics, chemistry, biological science, history, government and economics, literature, fine arts, and verbal factor. In addition, an advanced test is given in the field of major concentration.

A small group of Eastern colleges first entered the experiment with the Carnegie Institution in establishing the Graduate Record Examination. The mean for this small select group was much higher than the Eastern regional mean of today. The fact that more institutions and larger enrollments are participating in the examination would in part account for the lowering of the achievement of the region. The number of students participating in the Eastern Graduate Record Examination was 1,693 while in the Southern region only 453 students participated. Most of the students who took the Graduate Record Examination last year were students who majored in some area other than a premedical area in as much as only eighty-two students were listed as being premedical students.

With reference to the Graduate Record Examination, it has been suggested that emphasis has shifted in the social sciences so that the examination in that area is outmoded. As the examination now stands, however, it clearly indicates that the more highly verbalized an area of learning the poorer the showing of the current generation of students. The tabulations given below show that the means in social studies, literature, fine arts, and verbal factor are lower than the means in the more exact disciplines of mathematics, physics, and biology, and that there is considerable variation between the Eastern and Southern means.

MEANS

	Mathematics	Physics	Chemistry	Biology	Social Studies	Literature	Fine Arts	Verbal Factor
All Regions	436	449	447	449	382	408	422	403
Southern Region	445	444	448	456	357	408	396	372
Eastern Region	425	435	444	438	392	429	435	427
Medical Majors	425	494	500	565	345	375	401	408

In the Southern regions in general and in most of the colleges for Negroes the students are weak in the verbal factor and in reading comprehension

and speed. The poor schools, poor teachers, and limited cultural experiences of the region are reflected in a lower mean in social studies, fine arts, and verbal factor than the national mean. In mathematics and chemistry the Southern mean is higher than the national mean. There is the probability, however, that only a small number of selected Southern students offered themselves for the Graduate Record Examination.

The two afore-mentioned examinations give some indication of the type of preparation expected of students with a well-rounded liberal education. A student should have reading and writing skills, mathematical ability, and psychology as tool subjects for comprehension, expression, and self-analysis. He should have an acquaintance with the fine arts. His experience in science should include readings for the appreciation of the methods and of the history of science as well as for factual information. The biology should include either a semester of botany or a general biology course, with a generous portion of a semester devoted to botany. The first courses in the physical sciences should precede the biological course if an understanding of the physico-chemical nature of functional biology is to be understood. Concentration in bacteriology, histology, or anatomical courses, or advanced courses in physics and chemistry at the expense of a more general education should be discouraged.

4. ***Essential Qualifications for Pursuing a Medical Curriculum and Standards for Measuring Achievement and Interest (Experiences of the Veterans' Counseling Service)***

A report on experiences from the Veterans Guidance Centers on predicting success in medicine reveals that the medical aptitude test standings alone exclude fifty-three percent of those who would fail at a possible expense of only five percent of high ranking students. When the college record is added, the prediction of success is more reliable.

"As a result of its experiences on success of veterans in medicine, the Veterans Counseling Service recommends the following qualifications, tests, and achievements for predicting success:[1]

[1] "Summary of Survey Made by Veterans Administration Predicting Veterans Chances for Success in Medical School."

ESSENTIAL QUALIFICATIONS	RECOMMENDED TESTS AND STANDARDS	
	HIGH SCHOOL GRADUATES	COLLEGE STUDENTS
a. Superior aptitude for college and medical school work	Graduation in top quarter of high school class *American Council on Education Psychological Examination for College Freshmen, 1944.*	Undergraduate standing in third of class with minimum average of B *Scholastic Aptitude Test for Medical Schools Form 1*
b. High achievement in the natural sciences	Average of B in high school science courses *Cooperative General Achievement Tests, Revised Series*	Average of B in college courses in biology, chemistry, and physics Cooperative College Biology Test A.C.S. Cooperative General Chemistry Test for College Students. Cooperative Physics Tests for College Students
c. Interest typical of successful physicians	*Vocational Interest Blank For Men*, Revised (Strong) (Score of B plus or A on physician key.) *Vocation Interest Blank for Women, Form WA (Strong) (Score of B plus or A on physician key.) *Kuder Preference Record (High scientific and social service scores.)	*Vocational Interest Blank For Men*, Revised (Strong) (Score of B plus or A on physician key.) *Vocational Interest Blank for Women, Form WA (Strong) (Score of B plus or A on physician key.) *Kuder Preference Record (High scientific and social service scores.)

*Asterisk indicates alternative test.

Students from some schools consistently perform better than students from others. This may mean better college teaching and broader experiences in the curriculum in those institutions. In a good liberal education with a balance among the humanities, social studies, and sciences a student may become prepared for the study of medicine by limiting the hours of credit earned in any of the three broad divisions to sixty and taking at least thirty hours in each of the other two. The academic requirements for becoming a successful physician, scientist, lawyer, business man, or minister are satisfied with this same liberal education. The student's interests and ability, the school's curriculum, and teachers will determine the distribution of the student's time in college. In general, ability to think in scientific terms is more important than the factual information acquired in the college science courses.

There may be differences in laboratory facilities, in quantity or quality. Many science skills depend upon well-equipped laboratories. Frequently the influence of only one science teacher or of a group of them may lend the intangible spark necessary for stimulating students. In the preparation of students for the study of medicine through training in the sciences it is necessary to have good teaching, responsive and intelligent students, and adequate equipment to obtain the objectives of the science courses.

5 *Selection and Guidance of Premedical Students*

In order to make the fullest use of high mental ability, a certain amount of discipline and emotional stability is essential. If the colleges do not select their students through objective and subjective tests and interviews, then it is necessary for the advisers for students planning to study medicine to use all the facilities available to guide into medical careers those students with honest and consistent work habits, with personal integrity, and social responsibility. Some medical schools are making use of personal interviews and personality inventories, such as the Rorschach test and the Minnesota Personality Schedules, in the screening of applicants.

Vocational interest (such as the Strong Vocational Interest Test) and attitude tests are being administered by many medical schools and although their relationship with success in medicine is not so close as are intelligence and reading results, they are being improved and should be used in college guidance programs. The trend is toward a development of more objective bases for evaluation and a reduction in the use of highly trained personnel necessary for making appraisals. Assistant Dean C. F. Jacobsen[1] of Washington University has published several papers pertaining to studies on interest as a selective factor for students planning to study medicine.

6 *Physical and Mental Health of Premedical Students*

Physical and mental health should be carefully considered in the selection of students for the study of medicine. There is probably no training program which is as arduous and physically taxing as the long years of medical study. It is wasteful in economic, human, and training resources to permit individuals to enter upon this rigorous program who must subsequently drop out from lack of physical stamina or mental health.

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[1] Jacobsen, Carlyle F., "Interest and Attitude as Factors in Achievement in Medical School," *Journal of Association of American Medical Colleges*, May 1946.

PART III

Status of Premedical Education in the Colleges Surveyed-- Over-all or General Picture With Reference to Curricula and the Selection and Guidance of Students

1. *Premedical Curricula and Extent to Which They Provide Courses in Preparation for Competitive Admission to a College of Medicine*

Summary of the Data

One of the first areas the Survey addressed itself to was that of established premedical curricula in an attempt to determine to what extent the colleges offered the premedical student opportunity (1) to meet the minimum requirements of the Association of American Medical Colleges, (2) to meet the additional requirements prescribed by certain medical colleges, and (3) to pursue such courses in the humanities and the social sciences as would contribute to his preparation for the Medical College Admission Test and the Graduate Record Examination.

In response to the question "Does your institution offer a two-year premedical course at the completion of which students are recommended for medical college?", twelve of the fifteen institutions responded in the negative and only three in the affirmative. Of the three schools which offered the two-year program, at least one of them did so as a wartime expedient but had not deleted the offering from the catalog. Eight of the schools either specify a four-year curriculum or strongly urge premedical students to obtain the Bachelor's degree before applying for admission to a medical college. Seven of the colleges include in their catalog a schedule of prescribed courses for premedical students, so that the nature and extent of their training was at once evident.

All of the colleges not only offer the minimum requirements in biology, chemistry, and physics, as prescribed by the Association of American Medical Colleges and the Council on Medical Education and Hospitals of the American Medical Association, but all of them carry in their catalogs listings which would satisfy most of the qualitative requirements of the more exacting medical colleges. Data were collected which indicate that, insofar as science courses are concerned, each of the fifteen institutions has projected a satisfactory premedical curriculum. Thus, all of the colleges offer from four to eight semester hours of credit in comparative vertebrate anatomy and advanced physics and from three and one-half to eight semester hours of credit in vertebrate embryology. All except one college offer from four to eight semester hours of credit in physical chemistry. Only two of the colleges, however, offer a course in general physiology, a discipline which is most desirable and probably is to be preferred for the premedical student to courses in advanced physics or a course in physical chemistry.

The "premedical curriculum," as set down by the Association of American Medical Colleges and the Council on Medical Education and Hospitals of the American Medical Association, and in terms of minimum college preparation, does not, however, prescribe or suggest the nature of the twenty-six semester hours of electives required to bring the total number of hours to sixty. Nevertheless, perhaps the major barrier the prospective medical student has to hurdle is the passing of the Medical College Admission Test and, in some instances, the Graduate Record Examination with a score at or above the 50th percentile, and it is usually in the sections of these examinations which deal with nonscience subjects, and with astronomy, botany, and geology that the Negro premedical student is least proficient. The Medical College Admission

Test embraces, besides the sections on premedical sciences and mathematics, a section on verbal ability (social and humanistic materials) and a section on "Understanding Modern Society." The Graduate Record Examination, besides its sections on the sciences and mathematics, covers history, government, and economics as a unit, literature, fine arts, and verbal facility.

The "premedical curriculum," therefore, as defined in this report, embraces all of the formal collegiate experiences, science and nonscience, which contribute to the preparation of the student for successfully competing for entrance into a college of medicine. Previous reference to the Medical College Admission Test, required by all accredited colleges of medicine and the Graduate Record Examination, required by a few medical colleges, has brought to light the fact that these examinations require the broadest type of experience in the science and nonscience areas. Examination was made, therefore, of required survey course offerings for premedical students in the humanities, the sciences and the social sciences. Unfortunately, literature and fine arts were identified together and given rank along with the humanities and the social sciences. Three categories in the nonscience areas were thus established in the questionnaire employed and had to be dealt with.

Thirteen of the schools require of their students at least one survey course in one of the three nonscience areas as a prerequisite for graduation. Of two schools that require only one survey course, one of them stipulates that the course be in the field of literature and fine arts and the other specifies a course in the social sciences. Seven colleges require survey courses in two of the areas -three of them specify the humanities and the social sciences and four of them specify literature and fine arts and the social sciences. Four of the colleges require the successful completion of a survey course in each of the three areas. Of these four colleges, two of them require, apparently, a "standard" course in each of the three areas in addition to the survey courses. The other two colleges do not require a "standard" course in any one of the three areas in addition to the survey course. The two colleges that require no survey courses stipulate the completion of at least one "standard" course in each of the three areas prior to graduation.

Eight of the fifteen colleges offer survey or introductory courses in the biological and/or the physical sciences, but of these eight, only two of them require the offerings of science majors.

Interpretations and Conclusions

As far as "standard" offerings in the sciences are concerned, there is no question but that all fifteen of the colleges offer, not only the minimum number of courses, but they also offer qualitatively and quantitatively the requirements of most of the more exacting medical colleges. There is, however, one area in which the course content of one of the minimum requirements does not seem to adequately prepare the students.

The Association of American Medical Colleges specifies as a minimum requirement in biology eight semester hours. The word "biology" means the study of both animal and plant life, but only three of the fifteen schools offer to their premedical students a course which one would assume included the study of both animal and plant forms. Thirteen of the schools, including two of the three which offer general biology, also offer at least one quarter or one semester of work in botany, but only five of them require the course of biology majors. It is doubtful if the premedical student who majors in chemistry or physics pursues a course in botany in these five colleges. In most cases, it appears that the premedical student takes general zoology as his first course in biology and hence receives very little instruction in botany.

The exclusion of botany as a part of the general course in biology or from the required science courses is a decided disadvantage to the premedical student in as much as the competitive examinations almost always include questions from the field of botany. Also, the discovery of the antibiotic agents has given new and greater importance to botany, and the premedical student should be provided with some of the basic knowledge in this field.

Bridging the gap between biology on the one hand and physics and chemistry on the other hand is general (cellular or comparative) physiology which utilizes the tools of both physics and chemistry in studying fundamental cellular activities. Such a course gives the student a most adequate background for understanding the fundamental activities of the human body and, in addition to the basic concepts derived from it, it provides him with investigational technics which he will later be called upon to utilize, especially in his course in human physiology in the medical school. The Survey disclosed the fact, however, that only two of the institutions visited offer this discipline. The reasons for the absence of such a desirable course above the minimum requirements are probably (1) lack of sufficient instructional personnel, (2) lack of available space, and (3) lack of the specialized equipment needed for giving the course.

An analysis of the data concerning required survey and "standard" courses in nonscience areas is somewhat difficult. The over-all picture seems to be that there is no uniformity in these requirements--some schools specify one, two, or three "standard" courses in these areas while others stipulate one, two, or three survey courses. Even in cases where survey courses were said to be required, a study of the catalogs reveals the fact that in some instances the student, and especially the premedical student, has a wide choice of selection and may entirely escape some of the courses. Thus, in one college the student may pursue art appreciation or military science; he may pursue general psychology; or he may elect military science. In another school, philosophy or psychology is required, but "Students majoring in mathematics or one of the natural sciences may be relieved of this requirement." In still a third instance, the student is free to elect either Introduction to World Literature or Introduction to World History. How well the "required" course offerings in these areas serve the purposes of the individual colleges can be determined only through self-analysis in the light of the objectives of each college. As far as the premedical curriculum is concerned, it would seem that its needs would be best served by a two-year survey course in the social sciences and a two-year survey course in the humanities. The so-called "restricted elective," in which the student chooses one of a number of "standard" courses, appears to be quite inadequate as he does not obtain instruction in other equally important areas.

With only two exceptions, science majors in the colleges surveyed are not required to pursue survey courses in the natural sciences. As a matter of fact, these courses are not open to science majors. Science teachers have been reluctant to have their students follow the survey courses on the theory that they would pursue the same materials in the beginning "standard" courses. This assumption in the main is justified, for the majority of the science survey courses in these colleges are simply introductory courses in biology and physics fitted to the needs of the nonscience student. The college student, and this includes the science as well as the nonscience major, is in great need of instruction which will lead to a development of the scientific attitude; he needs to understand the nature of the scientific method and to develop the habit of using that method in his daily life; he should become acquainted with the historical development of science and the relationship of the contributions of science to human life in their broadest aspects.

Recommendations

In as much as one of the first and major prerequisites for the training of students is a sound curriculum--one which adequately provides for the objectives of the training program--it is essential that a re-evaluation of the premedical curriculum in the colleges surveyed be made. It is, therefore, recommended

1. That the colleges make a self-appraisal of their offerings with the point in mind of ascertaining the extent to which these offerings provide the students with a well-rounded general or liberal education.

2. That a committee to be known as the Committee on Premedical Education be formed, and that members of this committee be drawn from the administration and the divisions of the humanities, the sciences, and the social sciences.

3. That the functions of the Committee on Premedical Education be clearly stated, and that regular meetings of said committee be scheduled.

4. That the Committee on Premedical Education provide for itself a collection of literature on premedical education and that it further provide for itself a complete and continuing file of all publications devoted either continuously or periodically to the training and/or selection of premedical students for medical curricula.

5. That following the establishment of the Committee on Premedical Education and the self-appraisal and re-evaluation of the curriculum in premedical education, the premedical curriculum as formulated and approved by the Committee on Premedical Education be published in the college's catalog.

6. That consideration be given to the establishment of a divisional or general science major for premedical students in order to provide for the acquisition of all of the requisite disciplines appertaining to premedical instruction.

7. That where necessary a restudy be made of the contents of the course offered in satisfaction of the eight semester hours in "biology" as required by the Association of American Medical Colleges with the view in mind of providing, in such a course, instruction in the field of botany. Or, in lieu of providing instruction in botany in the course designated as general biology, that a quarter's or a semester's course in botany be required of premedical students as a part of the premedical curriculum.

8. That consideration be given to the introduction into the premedical curriculum of a course in general (cellular or comparative) physiology.

9. That a restudy be made of the required offerings in the social sciences and the humanities in the light of the college's objectives and the objectives of the premedical curriculum and where necessary, changes be made in order to implement these objectives if the present offerings do not provide for the broadest possible training in these areas.

10. That at least a full year of instruction be provided in the historical development of the biological and physical sciences with the view in mind of developing in students the scientific attitude as well as to impart some of the factual knowledge of science.

2. *Selection and Guidance of Premedical Students*

Summary of the Data

A. The Premedical Student as Seen by the Deans and Science Instructors

As a preliminary to the study of selection and guidance of premedical students, the Survey sought to obtain an appraisal of the average freshman premedical student from the deans and science instructors. The caliber of the average Negro premedical student is well known from the personal experiences of those who instruct these students, and more objectively, from the reports referred to in an earlier section of this study. The socio-economic factors responsible for the below-average academic achievement of the average Negro high school graduate are also well known, and although the freshman students in the colleges surveyed represent probably somewhat better than the average Negro freshman college student, it was felt advisable to obtain from the deans and science instructors expressions of the degree to which they felt certain factors were responsible for the poor preparation of their freshman students.

Ninety-three percent of the deans and ninety-five percent of the science instructors felt that a lack of effective study habits and a failure to develop the reasoning faculties had great influence upon the low level of achievement of their freshman students. Forty-seven percent of the deans and forty-six percent of the science instructors believed that insufficient motivation in the primary and secondary schools had great influence upon the inability of their freshman students to measure up to the average freshman student in American liberal arts colleges. With respect to teacher proficiency and competence in the primary and secondary schools, seventy-three percent of the deans and sixty-three percent of the science instructors felt that the inability of their freshman students to meet required standards was attributable in great measure to poorly prepared teachers on the aforesaid academic levels. Seventy-three percent of the deans felt that a general lack of laboratory equipment in the secondary schools had great influence on the low level of achievement of their freshman students in the science areas, but only forty-five percent of the science instructors held this view.

With reference to the poor achievement of Negro premedical students on medical aptitude tests, eighty-six percent of the deans and ninety-five percent of the science instructors felt that this showing was due in large measure to the fact that the premedical curriculum attracts many students primarily because of the social prestige and the monetary returns attached to the medical profession and that a goodly number of these students are not apt in the field of science.

B. Selection of Premedical Students

In past years, very few of the colleges surveyed gave extensive consideration to the selection of entering freshman students for the premedical program. At least there was no formal procedure for selecting the students. The usual procedure followed was simply to accept the statement of the student that he wanted to study for the preparation of medicine or else the student consulted with an adviser who ascertained from him his choice of vocation. Very little was done in the way of determining the student's aptitude for the study of medicine or measuring his interests and emotional stability. In only two of the colleges was the program of student selection in the hands of full-time, trained personnel.

For the colleges visited, the Survey brought to light the fact that only seven of them employ any of the occupational preference tests and interest inventories in assisting students to choose their field of concentration.

Also, even in the case of those seven colleges, only three of them test the entire freshman class in order to make known to the respective students their special aptitudes and interests. Only three of the schools refuse students admission to the premedical curriculum if they demonstrate a lack of aptitude and interest for the premedical sciences. Nine of the fifteen deans held the view that superior students who otherwise might have entered the premedical field are lost to the premedical curriculum because of the absence of a selection and guidance program or because of the failure of their selection program to discover such students and direct them into the premedical curriculum. Data were also obtained which indicate that a goodly number of high school students who show great possibilities for the premedical sciences fail to enter college because of their inability to meet the financial obligations, and, in particular, the premedical curriculum because they envision absolutely no means of financing their medical education.

C. Remedial Programs

It is well known from many previous studies that the average Negro high school graduate is deficient in English, reading comprehension, verbalization, and mathematical expression. It is also well recognized that the premedical curriculum, no less than any other field of study, is one which requires of the student excellent study habits and the ability to apply himself effectively for long periods of time if a high level of achievement is to be attained. It should not be expected, then, that the deficient student would be able to enter upon such a program and do satisfactory work in spite of his handicaps. Without effective remedial measures, the student usually continues in his college program with the same deficiencies as indicated above, and graduates as a below-average product as judged by national standards. The Survey, therefore, attempted to determine how these deficiencies were being met by the several institutions. The findings were as follows: (1) freshman students are assigned to sections in English on a basis of placement examinations in fourteen of the colleges, but only eleven of them make assignments to sections in mathematics on a basis of placement examinations; (2) freshman students with remedial courses are given reduced loads in the majority of the colleges, but in five of the institutions the student is allowed to carry a normal load. In three of the schools the programs of deficient students are generally prepared on an individual basis; (3) eleven of the institutions employ some form of silent reading test in order to measure reading comprehension, but in only six of the schools are deficient students placed in any kind of a reading clinic; (4) of the six schools that attempt a remedial reading program, none has the full-time services of a psychologist, psychometrist, or speech teacher; and (5) students in five of the institutions, regardless of their field of concentration, are required to achieve a certain level of reading comprehension before they graduate, but in the remaining ten, students apparently may be graduated whether or not they have achieved proficiency in this area.

D. Guidance of Premedical Students

As with the selection of premedical students, very little attention has been given to their guidance with reference to preparation for meeting the competition incident to admission to a college of medicine. What guidance has been practiced, has been, for the most part, in the form of an adviser-student relationship, and in the majority of these relationships it cannot be said that the adviser was cognizant of and familiar with many of the problems that face the premedical student. There has been very little formal consideration of the problems that face the premedical student, and he has been left almost entirely to shift for himself as best he could. To be sure, advisers do see that their students register for correct courses and assist them with many of their personal problems of adjustment and orientation, but, again, the findings

of the Survey seem to indicate that no directed and organized procedures have been employed in the guidance of the premedical student. Five of the fifteen deans indicated that they maintained a committee known as the Committee on Premedical Education or its equivalent, but in no instance was a premedical club or fraternity in existence. Twelve schools indicated the presence of a science club on their campuses, and in ten of them a chapter of some national honorary scholastic society was to be found.

Interpretations and Conclusions

Probably the most important function of the Survey was the attempt to uncover possible explanations for the low level of achievement of premedical students other than the known inadequate backgrounds and foundations brought by the students from their primary and secondary school experiences. Most of the factors which appear to contribute toward an explanation for the low level of achievement will be considered in later sections of this report, but it seems pertinent at this point to again focus attention upon the raw products with which the teachers have to work. The most important and directly operative factors responsible for the inability of the average Negro student to reach the average level of achievement of students in American liberal arts colleges seem to be the paucity of their storehouse of basic knowledge and educational experiences, formal or otherwise, their lack of reading comprehension and effective study habits and their inability to employ effectively their reasoning faculties. Perhaps also of great importance is the indication that the average Negro student enters college from an environment in which there was little motivation and few inspiring contacts. The students, perhaps, have very little inner drive and regard for high standards of achievement. It is apparent, that the average freshman student is handicapped in two of the fundamental prerequisites for academic achievement, namely, effective study habits and an inner urge or desire to achieve.

A majority of those who enter the premedical curriculum of the several schools, do so without having been screened or tested for their aptitude or interest in the field of medicine. An educational testing service, therefore, is sorely needed in order to bring into the premedical program only those students who are deemed fit by prescribed standards. Also, great difficulty is experienced by school officials in developing satisfactory remedial programs for students deficient in the fundamental areas such as English, reading comprehension, verbalization, and mathematical expression. This difficulty is occasioned by lack of personnel and physical space for the conduct of the needed classes. In most of the schools such remedial work as is conducted is considered entirely inadequate.

Recommendations

It is recommended, with reference to the selection of premedical students,

1. That colleges and universities throughout the country request the Association of American Medical Colleges to establish through the Educational Testing Service a National Premedical Testing Board, whose function shall be the testing of senior high school students throughout the United States in an attempt to discover students who have the requisite aptitude, interest, and emotional stability for entering upon the study of subjects which serve as a preliminary to their preparation for a career in medicine. It would appear that such an undertaking is the logical forerunner of the Medical College Admission Test, for by insuring the caliber of student who enters the premedical program the number of failures on the Medical College Admission Test and the Graduate Record Examination would be reduced and the medical colleges of the Nation would be assured a higher percentage of high-caliber students than they now enjoy.

In the interim pending the decision to establish a National Premedical Testing Board, it is recommended

2. That colleges which now offer premedical curricula or which propose to do so take immediate steps for discovering students who, on a basis of aptitude, interest, and emotional stability, show promise of development into high-caliber medical students, and that only such students as measure up to requirements be admitted to the premedical curriculum.

3. That premedical scholarships be provided for such students as are discovered with the requisite aptitude, interest, and emotional stability for pursuing the premedical curriculum but who are unable to finance either in part or in toto their college education.

4. That the retention of such scholarships by premedical students be contingent upon the maintenance of a high level of academic achievement, such level to be determined by the Committee on Premedical Education.

Realizing the fact that the majority of entering freshman students have not developed the ability to reason clearly and logically, are unable to comprehend the printed page and verbalize that which is comprehended, and are below average in their quantitative expressions, it is essential, before results can be expected from remedial measures in definitive areas, that students be made familiar with the fundamental principles underlying the learning process. It is recommended, therefore,

5. That the colleges make a study of the needs of their students for aid in the technics of study in the various areas, and that where necessary the proper procedures be employed in correcting this deficiency.

6. That a re-evaluation of remedial courses in English, reading comprehension, verbalization, and mathematical expression be made with the view in mind of ascertaining the degree to which they effectively serve the needs of deficient students.

7. That in those colleges in which remedial courses in the areas mentioned above are not required of deficient students, consideration be given to the inclusion of such courses in the curriculum.

8. That the offering of remedial courses not be made at the expense of teachers already carrying near-maximum teaching loads, but that efforts be made to augment the faculty to that extent required for the effective administration of the remedial program.

With reference to the guidance of premedical students, the national honorary premedical fraternity known as Alpha Epsilon Delta plays a prominent and useful role. This fraternity was founded at the University of Alabama in 1926 and at the present time has thirty-six or more active chapters. It is recommended

9. That consideration be given to the establishment of a chapter of a national honorary premedical fraternity in Negro colleges.

10. That pending a decision on the establishment of a premedical fraternity, the premedical students in Negro colleges be organized into local premedical clubs.

11. That the premedical club be sponsored by the Committee on Premedical Education through one or more designated members of the Committee, and that in the conduct of the business of the premedical club use be made of the literature accumulated and held by the aforementioned Committee.

PART IV

Enrollment, Personnel, Physical Facilities, the Library and Laboratory Equipment in Relation to the Premedical Curricula--The Over-all or General Picture

1. *Increases in Enrollment and Staffs Between 1938 and 1948 and the Science Personnel--Its Quality and Quantity in Relation to the Number of Students Instructed*

Summary, Interpretations, and Conclusions

With three exceptions, all of the schools show an increase in enrollment of full-time liberal arts students over the 1938 enrollment from 65% to 290%. For eleven institutions from which data were obtainable, the increase in enrollment of science majors and premedical students over the 1938 figues, with two exceptions, was found to range from 131% to 305%. The arts and sciences teaching personnel showed increases in all colleges over the 1938 figures. Of the nine schools listed with increases in the number of its science students from 131% to 305%, only one of them had a 100% increase in the number of its science personnel. Eight of the schools showed an increase in the mathematics personnel from 100% to 200%, but only five of them had increases of 100% or higher in the English teaching personnel.

The problem of teacher load with reference to attainable results in the training of premedical students will be discussed in another section of this Report, but it may be stated at this point that the Survey discloses the fact that one of the most pressing needs of the colleges is an increase in their teaching personnel. With one exception, it was found that the average number of students per instructor for the combined departments of biology, chemistry, and physics ranges from 70 to 232. The average number of student clock-hours per instructor per week ranges, again with a single exception, from 331 to 853. The upper extremes of these figures for a single teacher without adequate and qualified assistants are 460 students and a student clock-hour load of 1,431 hours per week. When it is realized that science teachers devote from two to three hours of laboratory instruction for each semester hour of credit their students earn; that the most effective science instruction is, or should be, conducted in the laboratory; that science instructors have numerous examination papers and laboratory exercises to grade; that, in most instances, they have to "set up" the laboratory and lecture demonstrations when these are employed; and that many of these instructors are on numerous committees--the fact that these colleges are in dire need of additional personnel is at once apparent.

It must be recognized, however, that the number of premedical students enrolled in the various colleges is quite incongruous with the number of students who are successful in gaining admission to medical colleges. For the 1947-1948 academic term there were more than 5,121 students enrolled in the premedical curricula of the fifteen colleges visited. Yet, only about 160 of all Negro premedical students from all of the colleges and universities of the country are successful each year in matriculaiing in a college of medicine, and a high percentage of these is of students who fail to achieve the 50th percentile on the Medical School Admission Test. It is quite apparent, then, that much effort is wasted in attempting to "production line" these students for medical careers.

An example of this wasted effort may be given. During the ten-year period between 1938 and 1947, one of the colleges surveyed sent to Meharry and Howard

a total of twelve students. This is just about one student per year. Yet, this college had enrolled in its premedical and science curricula in 1947-1948 a total of 111 students. In 1938 it had only thirty-four students in those curricula (a percentage increase of 227). The same incongruity holds for the majority of the schools surveyed. How much better it would be if the colleges admitted to their premedical curriculum only those students who give promise of high achievement and the instructors gave special attention to the preparation of these selected students for meeting the severe competition with which they will be faced in applying for admission to a medical college! If each of these schools could develop twenty high-ranking students each year, there would be three hundred students capable of competing for a position in the freshman classes of the medical colleges of the Nation. It might require five or more years to prepare some of the students, but with scholarship aid, it should not be difficult to place potentially good students in a remedial program designed to provide them with the necessary tools for mastering the premedical curriculum on a high level.

The problem of securing the much-needed teachers for the increased enrollments in the colleges surveyed is a much more difficult task for the private institutions than for many of the tax-supported schools, for they are quite unable to meet the salary demands of their present staffs, to say nothing of competing with many of the State schools. The Survey discloses the fact that one of the most serious and pressing problems facing the presidents of the privately owned schools and many of the State schools is that of retaining their top-ranking personnel, many of whom have long years of service.

The ranks and salary scales for science teachers in the colleges surveyed were tabulated and compared. Differentials between the highest and lowest salaries paid to teachers in the various colleges and within the same ranks are: for instructors, $2,600 (maximum of $4,000, minimum of $1,400); for assistant professors, $2,600 (maximum of $4,400, minimum of $1,800); for associate professors, $2,600 (maximum of $5,000, minimum of $2,400); and for full professors, $3,200 (maximum of $6,000, minimum of $2,800). Six of the colleges have not yet been able to pay the maximum professorial salaries authorized by their respective Boards, but even though they were paid, they would not be attractive enough for competitive bidding in the present market.

Following the program of equalization of salaries between Negroes and whites in the southern land-grant colleges, many of the State institutions have been able to provide salaries that are quite beyond the reach of the majority of the private institutions. Consequently, certain State institutions have been able to attract from the private colleges many of their best faculty members. Also, many industrial concerns during the war years came to realize that within the Negro population there was an untapped source of highly qualified biologists, chemists, and physicists, with the result that many instructors relinquished their academic positions for more lucrative ones in the industrial field. Also, a number of highly qualified instructors took advantage of the war-training programs and entered the field of medicine. The effect of these withdrawals from the faculties of the private college is reflected not only in the depletion of the science staffs but also in their reduction, in many instances, to mediocrity. Many of the schools, at one time, boasted of science faculties composed predominantly of Ph.D.'s, but at the present time all of the colleges are having great difficulty in retaining the few Ph.D's that have remained through either loyalty to the school or their love for the situation in which they have labored for many years. With few exceptions, all of the schools show a tremendous turnover in their science personnel between the years 1945 and 1948. In many instances, the losses were in top-ranking personnel, resulting in the disruption of long-standing programs and a consequent loss of continuity and direction. The 1947-1948 science staffs of most of the schools counted

very few Ph.D.'s among their number. Two of the schools had no Ph.D.'s on their science staffs, and six of them had only one; some of these have since departed.

In recapitulation, a critical shortage of science teaching personnel exists in virtually all of the schools surveyed. The shortage has been produced by either one or both of two factors, (1) tremendous increases in the number of students registered in science courses and pursuing the premedical curriculum and (2) the loss of personnel to other schools which were able to offer better salaries. The quality of instruction in all of these colleges is seriously jeopardized by overcrowding the laboratories and overburdening the teachers, and in many of them by having teaching responsibilities devolve upon unqualified personnel due to resignations, the vacancies of which could not be filled with personnel of equal training and caliber. If the colleges in this group are to plan for a higher quality of training in the field of premedical education, they must look first to replenishing their faculties in both quality and numbers and this can be accomplished only through greatly expanded budgets for salaries. A similar observation undoubtedly may be made for all areas of instruction in these colleges.

Recommendations

In view of the fact that the number and quality of the teaching personnel in relation to the number of students to be instructed are probably the two most important factors in the functioning of the educational program of a college, and in view of the fact that the quality of the educational experiences obtained by the students is in direct proportion to the quality of their instructors; and further, in view of the fact that the majority of the colleges in this study seem to have abnormally high numbers of students in their premedical curricula when these figures are compared with the numbers of students they respectively send to medical colleges, it is recommended

1. That the several colleges take cognizance of their personnel and facilities for administering a premedical curriculum and limit the number of students admitted to the program to that number which can be instructed in a manner in keeping with the best educational practices. That in limiting the number of students in the premedical curriculum, use be made of whatever information is available, especially the results of aptitude tests, interest inventories, and emotional stability tests, for directing students not suited for the premedical program into other occupational areas for which they seem to be better fitted.

2. That promising premedical students who are handicapped by basic deficiencies be placed in extensive and intensive remedial programs in an attempt to sharpen their basic skills to the point where they will be able to enter upon the premedical program with confidence, foresight, and the means of reaching a high level of achievement.

Inasmuch as the colleges are faced at present with large enrollments and inadequate teaching staffs, and considering the high probability--approaching certainty--that no college will refuse admission to a prospective student solely because he fails to qualify for the premedical curriculum, it is recommended

3. That every effort be made to acquire the additional personnel needed for maintaining a more normal ratio between students and instructors.

2. *Laboratory Facilities in Relation to the Number of Registrants in the Departments of Biology, Chemistry, and Physics*

Summary of the Data

The science laboratories of four of the institutions surveyed are in the administration building, while eleven of the colleges have either one or two science buildings. Considering all fifteen schools, the Survey disclosed the fact that in no instance were the total physical facilities considered adequate from the standpoint of available laboratory space. With one exception, all of the schools have definite plans for either erecting a science building or expanding their present facilities. Some of these plans were in execution at the time of the Survey. The execution of others was awaiting the procurement of the necessary funds.

Not one of the institutions possesses a physics building or a biology building. Three of the institutions possess chemistry buildings. Of these three institutions, one is, at present, well advanced with plans for remodeling the combination biology-physics building into a physics building and the erection of a biology building. The chemistry building of the second of these three schools was very recently constructed from war surplus building material, and at the time of the Survey additions were being made to provide much-needed classroom space. Biology and physics at this institution are taught in the administration building. The third school with a chemistry building has a combination biology and physics building. A fourth school, one with a combination biology and chemistry science hall, plans to convert this structure into a biology building and erect a chemistry building. The physics in this institution is taught in one of the administration buildings of the university system.

The number of laboratory stations in relation to the number of registrants in the three science departments is noteworthy. The general picture for the departments of biology is as follows: With possibly one exception, the floor space available and the number of laboratories are considered inadequate. One institution with three laboratories for instance, scheduled, in addition to advanced courses, eleven sections of its course in freshman biology during the 1947-1948 school term. These sections met in two-hour laboratory periods twice a week. Square feet of floor space devoted to biology range from 748 for a one-laboratory department to 6,300 for a five-laboratory department. In fourteen of the colleges, the number of laboratory stations for courses in biology range from a low of 20 in a college in which there are 152 registrants for laboratory courses to a high of 168 in a college in which there are 388 registrants for laboratory courses. In practically all of the schools the number of registrants exceeds the number of laboratory stations by several hundred percent.

These figures are not intended to convey the idea that a laboratory station is required for each registrant or each student. However, when the registrations are broken down into course enrollments and sections, it is found that in most instances the laboratories are overcrowded.

In the twelve schools without a chemistry building, the number of square feet of floor space given over to chemistry laboratories ranges from 1,366 for a two-laboratory department to 5,544 for a four-laboratory department. The number of laboratory stations ranges from a low of 40 with 174 registrants to a high of 198 in a college in which there are 275 registrants for courses in chemistry. As with biology, the number of registrants for courses in chemistry in most of the colleges far exceeds the available student stations per section resulting in overcrowded laboratories.

The majority of the institutions provide only one laboratory for the physics department. The square feet of floor space ranges from 705 to 3,500. Student stations range from ten in a department with sixty-four registrants to eighty in a department in which there are 124 registrants.

It was quite apparent, in several of the schools, that only minor repairs had been made to the science buildings since their erection. Perhaps not directly concerned with the quantitative aspects of the physical facilities, but certainly contributory to their quality as well as to the morale of the instructors, is the almost total absence of personnel for the upkeep of the science halls, their permanent fixtures, and the scientific equipment. It was quite noticeable, in most of the schools, that both equipment and fixtures had been grossly neglected throughout the years. The hoods in the chemistry department of most of the colleges were eroded and completely useless. Stockrooms, generally, were inadequate and unkept with no personnel to supervise them other than the instructors or student help. Many valuable pieces of apparatus were unusable because of the need of repairs--repairs which could easily be made by a laboratory technician who could also provide the services for the upkeep of the fixtures and equipment in the various departments. With one or two exceptions, the institutions have not been able to provide in their budgets for this much-needed service. Such a provision, however, would result in the conservation of fixtures and equipment and add many more years of use to their life.

Conclusions

The over-all picture with reference to laboratory space in the schools surveyed is one of great congestion. Science buildings which were adequate in 1938 are no longer capable of providing the space necessary for the increased numbers of students who have entered the premedical and science curricula. The scheduling of numerous sections of a given course have not, in all instances, relieved the situation but only added greatly to an already overburdened and inadequate teaching staff. In view of the fact that the laboratory sciences play such a prominent role in the education of the premedical student, it is essential that instruction in these areas be of the highest type and that it be given under conditions conducive to thorough learning. If these institutions are to make any serious attempt to train their premedical students to that degree to which they will be able to compete successfully for admission to the best medical schools of the Nation, it is imperative that they increase the number of laboratories devoted to biology, chemistry, and physics.

Recommendations

The low ratio that exists between the enrollment of premedical students in the colleges surveyed and the number of admissions to schools of medicine from each of these institutions has already been pointed out. A recommendation to limit the enrollment of premedical students has also been made. Should this recommendation be followed, each college would still be faced with the problem of providing adequate laboratory space for a heavy enrollment in the sciences, for the majority of those students who fail to qualify for the premedical curriculum would, no doubt, remain as majors in one of the science areas. Simply limiting the number of students admitted to the premedical curriculum will not, then, solve the problem of congestion and inadequate laboratory facilities. An expansion of present facilities, therefore, is urgently needed.

With reference to the alleviation of congestion in the laboratories of these colleges and the provision of adequate physical facilities in which laboratory courses may be taught, the following recommendation is offered:

1. That the colleges utilize to the fullest all the data they have pertaining to needs for increased or improved physical facilities for conducting their programs in premedical education in an attempt to obtain financial aid from whatever source is available and can be interested in their desire to train a larger number of adequately prepared premedical students.

With reference to present, and certainly to future, physical facilities, fixed equipment, and scientific apparatus, the following recommendation is strongly urged:

2. That the colleges include in their budgets funds for the employment of a full-time person whose duties, among others, will be the upkeep of the colleges' investments in the physical facilities for the sciences, the fixed equipment and the scientific apparatus. A further and most important duty of such a person should be the relief of instructors from their present wasteful-in-time-and-money responsibility for maintaining stockrooms and dispensing items to students, especially in the field of chemistry.

3. Library Holdings of Journals in the Field of Science

Summary of the Data

The journal holdings of each institution in the fields of biology, chemistry, physics, psychology, and general science were recorded. Since for graduate school offerings it is essential that complete files of journals be available this information was also obtained. The largest number of journals subscribed to was 119, of which twenty-seven were from volume 1 to the current year. The smallest number of journals subscribed to was five.

In the specific fields, only six of the schools possessed at least one complete journal file in the field of biology. Of these six schools, one of them possessed twelve complete files out of twenty-three journals subscribed to. All of the schools subscribed to at least one journal in the field of biology, but over fifty percent of them possessed less than ten journal files.

In the field of chemistry, six of the schools possessed at least one complete journal file. Of these six schools, one of them possessed seven complete files and twenty incomplete files. Fourteen of the fifteen schools subscribed to less than nine journals in the field of chemistry.

In the field of physics, five of the schools possessed at least one complete journal file. Of these five schools, one of them possessed five complete files and sixteen incomplete files. Two other schools possessed more than ten journal files, but the other schools possessed fewer than eight journal files and three of them did not subscribe to a single journal in physics.

The field of psychology was represented by at least one complete journal file in five of the schools. One school possessed seven complete files and twenty-seven incomplete files. One school did not subscribe to a single journal in psychology, eight of them subscribed to less than five journals and eleven subscribed to fewer than ten journals.

In the field of general science, represented mostly by the popular science magazines, complete files of at least one periodical were possessed by four schools while the largest number subscribed to was twenty-one. Twelve of the schools subscribed to fewer than ten periodicals in this field.

Analysis and Comments

Whether or not the scientific journal contributes much or very little *directly* to the preparation of the premedical student is debatable, but it cannot be denied that keeping abreast of developments in the several sciences is absolutely essential to the professional growth of the teacher. And this growth is reflected in the quality of subject matter taught as well as in the ability of the teacher to inspire and motivate his students. To remain scientifically alive and keen and invigorating, he must seek knowledge from original sources and not fossilize with textbook information which, during the present time, is often superseded ere it leaves the press. The scientific journals, therefore, make noteworthy contributions to the premedical curriculum, even though, in most instances, they reach the student indirectly by way of the instructors.

Aside from this aspect, however, is the belief that the premedical student, no less than the student of literature or sociology, should be familiar with the original sources of information in his field and should have a command, through actual use, of the technics of constructing a bibliography in the field of science. Such training can be made meaningful only if the original sources of information are available to the students.

An evaluation of journal holdings with reference to quality and quantity on a basis of the average holdings per liberal arts college will not be attempted. A comparison of the schools in this Survey one with another may, however, be made in an attempt to determine their relative holdings. Taking as a reference the 119 journals subscribed to by one of the fifteen institutions, it is found that only one college possesses 75% (89) or more of this number, and only one possesses from fifty percent (60) to seventy-five percent (89) of this number. Nine of the remaining twelve schools possess only from twenty-five percent (30) to fifty percent (60) of the reference figure while the libraries of the other three colleges subscribe to less than twenty-five percent of this number. One of the colleges possesses only 4.2 percent (5) of the journal holdings of the best institution in the group.

Recommendations

Recognizing the fact that the library is the well from which springs man's recorded experiences and that it should serve the needs of the college faculty as well as those of its students, the following recommendations are made:

1. That the colleges determine, through the necessary conferences between their librarian and the science staff, the minimum number of holdings and the most suitable journals in the fields of biology, chemistry, mathematics, and physics required for placing them on a par with the average college of their type and size.

2. That the colleges determine the most desirable standard reference works in the field of science needed for placing them on a par with the average college of their type and size.

3. That a determination be made of the most desirable periodicals for which complete files should be provided.

4. That, following the determination of the library needs of the sciences, the necessary funds be provided for placing current subscriptions, and as the occasion arises, for purchasing back numbers of files which are to be completed.

4. Laboratory Equipment and Department Budgets

It is quite difficult to evaluate the adequacy of the laboratory equipment in a given department, for what is considered adequate or perhaps absolutely necessary by one instructor may not be considered adequate or necessary by another. One teacher may be quite satisfied to work with a minimum amount of equipment, spending the major portion of his efforts in getting the scientific method thoroughly ingrained into his students and assisting them in developing good study habits and technics in the laboratory. Another instructor may attempt to have his students perform all or as many of the exercises in the manual as possible, and to do so he obviously would need all the equipment and material called for. In the field of physics, many of the fundamental experiments may be performed by a variety of different pieces of apparatus, and in some instances the same apparatus may be used for performing more than one experiment. Also, in the field of general physics, it is not uncommon to find equally good laboratory courses in different schools but in which the majority of the experiments performed, and hence the apparatus, are quite different.

The problem of the adequacy of the laboratory equipment in the schools surveyed was approached by preparing check lists for use in recording the permanent and semipermanent holdings for the departments of biology, chemistry and physics. The quantity of each item was recorded and an attempt made to determine the adequacy of some of the holdings in terms of the number of students instructed and their quality in terms of the courses offered. As no standards are available for comparing these holdings, the appraisals were based only on the opinions of the instructors who taught the courses and the opinion of the surveyor.

It is possible, so far as actual holdings are concerned, to make a fairly accurate comparison of the schools, one with another, and this has been provided for in the check lists. It should be emphasized, however, that the check lists of holdings employed in this Survey do not represent, by any means, all of the equipment possessed by the colleges. The attempt was made to record only those holdings which were employed in presenting the usual laboratory courses pursued by premedical students and which seemed to be essential for effective teaching. Unquestionably there will be differences of opinion as to what is "essential," but insofar as objective findings are concerned, there can be no disapproval of comparing the variety and quantity of equipment for instructing certain courses in one institution with the variety and quantity of equipment possessed by the other schools surveyed.

BIOLOGY--SUMMARY OF HOLDINGS

Microscopes

The compound microscope is one of the most expensive items that the biology student has to work with, and one which should be provided for each of the largest number of students in a laboratory section requiring its use. In many instances microscopes must be used by the students in more than one course during the same period, and in those institutions in which more than one laboratory is available, it frequently happens that two or more sections of the students in one course must make use of the instruments at the same time. Thus, anyone who is familiar with biology laboratory instruction in the average Negro college knows that the teacher is faced with the problem of providing microscopes for many more students than he has instruments.

Data are provided which give concrete proof of the need of institutions in this Survey for additional microscopes. The shortage of these instruments is not only a constant source of worry and additional work on the part of the instructors, but a definite handicap to the student. It is a physical impossibility for

two students to effectively make use of a single microscope during a laboratory period in which only one student should be using it, and yet all of the biology departments are faced with the problem of accomplishing this feat.

The number of compound microscopes possessed by the various departments ranged from eleven in one college which has 121 registrants in courses requiring the use of a microscope to approximately 105 in a college which had 379 registrants in courses requiring the use of the microscope. Comparing the number of registrants in courses requiring the use of the microscope with the number of instruments available, it was found that the various departments possessed from one microscope per eleven registrants to one microscope per 2.17 registrants. Six of the fifteen departments had a ratio of more than four registrants per microscope.

Shortages in binocular dissecting microscopes for advanced courses, such as embryology, and in simple dissecting microsccpes were found in most of the departments. The number of binocular dissecting microscopes need not be great, but it should be sufficient to allow for fairly smooth use by groups of students. Only four of the departments possessed more than four of these instruments, while eight of them possessed less than four.

The simple dissecting microscope probably should be used at some time by each student in the general courses of botany and zoology. Opinions no doubt differ from instructor to instructor as to the necessity for this type of magnifying instrument, but it cannot be gainsaid that the student works with many structures which should be magnified for effective study. One of the departments possessed what appeared to be an excessively large number of these items--185--while twelve of them had less than twenty-seven. Four of these twelve departments possessed less than two simple dissecting miscroscopes!

Prepared Microscope Slides

Intimately associated with the microscope is the prepared microscope slide for courses in general biology, invertebrate zoology and embryology. The microscope becomes useless in the absence of specimens to be studied, and additional confusion is introduced into the laboratory when the number of slides is less than the number of students with microscopes. The well-conducted course, especially the advanced one in which the microscopist has to make detailed observations and return frequently to slides previously studied, provides a set of slides for each student. Even the general courses should make this provision or else have available a sufficient number of each slide so that students will not have to wait for a particular specimen to be released or wander about the laboratory asking "who has slide so-and-so?".

The following question concerning microscope slides was included on the checklist: "In courses such as histology and embryology, does each student have a complete set of slides or do they have to exchange slides?". Fourteen responses indicated that the students in seven of the departments have to exchange slides. Two departments had complete sets of slides for a few students while only five of them provided sets for all of the students in a given section of these two courses.

With reference to four categories of microscope slides, an attempt was made to determine their variety and quantity, whether good, fair, or poor. Nine of fourteen departments are from "fair" to "poor" in two or more of these categories. Five of them are "poor" in fifty percent or more of the four categories.

Equipment for Visual Instruction

It is a well-known fact that the motion picture projector, the slide and film strip projector and the microprojector are unsurpassed in the facility with which they convey information and give instruction in difficult areas of learning. The motion picture projector in particular, with the wide variety of subjects available in biology, chemistry, physics, and general science, has made great contributions to the technics of teaching, and no one knows this better than the personnel responsible for the detailed and technical instruction given in the Armed Forces. Many biological, chemical, and physical phenomena which otherwise could not be demonstrated in the small college may be brought before the students at very little expense by the use of this implement. Also, many phenomena in these areas, difficult of verbal impartation, may be brought vividly to life, and by no other means.

The extent to which the various instructors employ visual aids in their courses was not determined, but a check was made of their holdings in the machines, slides and film strips, film library, and charts. All fourteen of the departments of biology from which data were received had available to them at least one lantern slide or film projector, but four of them did not have the use of a motion picture projector. Three of the departments did not possess a microprojector. Films were rented or secured from State agencies by all except probably one institution, and none of them possessed an adequate library of subjects. Various numbers of lantern slides ranging from approximately seventy-one to 500 were tabulated and four of the department heads indicated that their holdings were inadequate. The lantern slides in two other departments were said to be adequate. Nineteen sets of charts in the various areas of biology were included in the checklist, and of this number seven of the departments possessed less than five. Two of them did not possess any charts. The highest number of sets of charts in any department was ten, and three of the chairmen indicated that their supply was adequate.

Human Anatomical and Zoological Models

Nineteen human anatomical models were checklisted and blank spaces were provided for seven additions. The numbers possessed by the various departments ranged from a low of three to a high of twenty-one. Eight of the departments owned less than ten models in this category. Models of invertebrate and vertebrate specimens for use in comparative vertebrate anatomy, embryology, and invertebrate zoology were checklisted through twenty-six. The largest number contained in any department was thirteen. Eleven of the departments possessed fewer than eight models and five of them possessed fewer than five. How many, if any, models a department should have is not under consideration. These tabulations are only comparative findings in the schools surveyed.

Variety of Permanent and Semipermanent Specimens for Specified Areas in Comparative Anatomy

The past fifteen years have seen the introduction of numerous types of preparations of the vertebrates for use in courses of comparative anatomy. While no one would consider these preparations absolutely necessary for laboratory instruction, they serve a very useful purpose by more vividly presenting to the student structures which are usually difficult to reveal and which, therefore, are clearly seen by only the better students. A checklist of these preparations and items included cartilaginous and osseous systems from the vertebrate classes, corrosion specimens of circulatory systems, comparative sets of brains and aortic arches. The quantity of each preparation or item was requested, for, if they are to serve for more than demonstration purposes, a sufficient number of most of

them should be provided for each small group of students. This factor of quantity is especially important in view of the fact that many of the classes in comparative anatomy run as high as fifty or more students per section in some of the schools visited. Qualitative holdings of these preparations and items without regard to quantity will be given in this summary. It may be stated, however, that the majority of the schools possess only small numbers of items which probably should be had in greater quantity.

Forty-one preparations and items were checklisted. Of the fourteen departments from which data were obtained, one of them indicated its holdings as adequate. The greatest number of these entries recorded for any department was thirty-four and the smallest number was one. Nine of the departments possessed from ten to thirty-four of these forty-one entries while four of them possessed less than ten.

Variety of Permanent and Semipermanent Specimens for General Zoology

Total holdings of museum and demonstration liquid mounts, dry mounts, and bio-grams in each of the invertebrate phyla above the Protozoa were obtained. These phyla, therefore, constitute a part of the variety which was checklisted. Seven phyla and four classes of an eighth phylum were checklisted. To these groups of specimens were added sixteen other individual items which are commonly found in the general biology or zoology laboratory. Of the twenty-seven entries on the checklist, one department indicated its holdings as adequate. Five departments had holdings in fifteen to twenty-one of the entries on the checklist, while eight of them possessed holdings in less than thirteen. One department had holdings in only one of the entries.

CHEMISTRY--SUMMARY OF HOLDINGS

With the exception of physical chemistry, the variety of specialized equipment for chemistry courses in the liberal arts college is not large. After supplying the usual items to be found in the student laboratory desk drawer and locker, very few additional items are needed for the courses in general chemistry, qualitative and quantitative analysis, and organic chemistry. It is to be expected that adequate supplies of chemicals, glassware, porcelainware, and hardware will be available for student use and that the laboratories are equipped with basic pieces of apparatus. With increases in enrollments, however, many of the chemistry departments in the schools surveyed are short of items which should be supplied on an individual basis and numerous pieces of laboratory equipment possessed by three of the departments are variously and conspicuously absent from the other twelve departments.

Although thirteen of the fifteen chemistry departments offer a course in physical chemistry, only three of them have significant holdings in the specialized equipment for giving such a course. Students who pursue a course in physical chemistry in the majority of these colleges, engage in what would appear on the basis of the variety of apparatus possessed, to be an unacceptable minimum of laboratory work.

PHYSICS--SUMMARY OF HOLDINGS

Three of the fifteen colleges surveyed are poorly equipped for conducting a course in general physics. The other twelve colleges range from fair to excellent with reference to the variety of equipment but there is hardly a single one of them that does not need a larger quantity of many pieces of apparatus. Still speaking in terms of variety of equipment, only one of the fifteen physics departments thought itself inadequate in its holdings of apparatus for experiments in

mechanics while three thought themselves inadequate in the area of magnetism and electricity. Four of the departments thought themselves inadequate in equipment for conducting experiments in heat while five expressed themselves as deficient in apparatus for conducting experiments in sound and light.

DEPARTMENT BUDGETS

A source of great concern to many department chairmen is that of annual expenditures for perishables, replacements, and/or additions to the laboratory equipment. The major criticism advanced by many was that department chairmen operated upon a requisition basis, drawing against a fund the size of which was unknown to them. It was pointed out that if budgets were prepared with the assistance of chairmen and funds allocated more nearly on a basis of needs, a more judicious selection of items could be made in the light of the amount of money available.

It was determined that in seven of the fifteen colleges surveyed, department chairmen prepared annual budgets which were satisfactorily honored while the chairmen in the remaining eight colleges submitted requisitions as needs arose against funds the amounts of which they may or may not know.

A comparative study was made of the amount of money spent by each of the fifteen colleges for perishables, replacements, and/or additions to the laboratory equipment for biology, chemistry, and physics. It is recognized that the figures obtained may not be entirely comparable, but it is felt that they convey some idea of the extent to which the colleges are providing funds for equipping their science laboratories and keeping them in supplies. The expenditures for biology, chemistry, and physics were divided by the combined number of registrants in science laboratory courses, giving expenditures per registrant. It is again pointed out that these expenditures per registrant may have very little comparative significance as far as needs are concerned, for a college with well-equipped laboratories would expend less per science-course registrant than the college in the process of building up poorly equipped laboratories. With the exception of possibly one or two colleges, the expenditures listed below did not include "special purposes" outlays of funds.

School No.	Expenditures in 1947-1948	Combined number of science registrants	Expenditures per registrant
1	$1,325	254	$5.22
2	3,500	485	7.20
3	4,000	298	23.50
4	4,195	443	9.45
5	4,209	377	11.17
6	4,430	399	11.10
7	4,991	868	5.75
8	6,741	694	9.70
9	7,000	601	11.63
10	9,600	619	15.90
11	10,453	972	13.20
12	11,726	722	16.20
13	20,000	893	22.40
14	52,191	1980	26.40

Recommendations

The role of the laboratory in imparting scientific information cannot be overemphasized. Within the laboratory, the student learns by doing, and all of the technics and knowledge gained in the laboratory are of direct benefit to him

in later science courses. Experiences gained for the first time and apparatus seen and used for the first time in medical college when they should have been gained, seen and used in premedical courses place the student at a distinct disadvantage. It is necessary, therefore, if the Negro premedical student is to be adequately trained, that he be provided, not only with the necessary apparatus in point of kind, but also that necessary equipment be supplied in a quantity in keeping with the number of students requiring their use. It is recommended, therefore

1. That the colleges recognize the increased demands for equipment and supplies in the science areas and explore all possible sources in seeking funds with which to supply the basic and special needs of the science departments.

2. That certain of the surveyed colleges recognize the fact that many areas of their science offerings were poorly presented due to lack of apparatus or insufficient apparatus in the years preceding the postwar increases in enrollment, and that, due to these increases, the effectiveness of laboratory instruction has decreased to a dangerously low level.

3. That science instructors seriously consider the feasibility of employing motion pictures and other visual aids on a wider scale in the presentation of certain areas of their courses, and that where necessary in order to provide for a smoothly running program the requisite equipment and film libraries be made a part of their permanent holdings.

4. That, where necessary, the matter of department budgets or requisitions be discussed between department chairmen and the proper administrative officers in order to resolve as much as possible departmental difficulties as well as to clarify the administrative policy.

PART V

Some Possible Contributory Factors to the Present Status of Premedical Education in Negro Colleges Apart From the Known Preparatory Inadequacies of the Students

1. *A Commentary on the Status and Attitudes of Science Teachers in Many Negro Colleges and Their Possible Bearing Upon the Quality of Science Instruction*

Since 1930 an ever-increasing number of well-trained and highly trained Negroes in the sciences and in mathematics have assumed teaching responsibilities in Negro colleges. Why is it, then, that the majority of these teachers, despite the fact that their student material was, on the whole, unprepared for pursuing a premedical curriculum, have produced so few students who were able to reach the fiftieth percentile and above on the Medical College Admission Test? It is admitted at once that the answer to this question probably is indeterminate, as there are so many factors that contribute to and influence the educative processes. It would appear, however, that even with students who were inadequate in some of their preparatory courses and the tool subjects, the teachers in our colleges could have done a better job had they been working in or assisted in the creation of an environment conducive, not only to learning on the part of the student, but also to the development and nurturing of initiative, enthusiasm, imagination, and hard work on the part of themselves and their colleagues. It is the purpose of this commentary to inquire into the former status of science teachers in an attempt to determine to what extent they enjoyed and participated in the establishment of that type of educational environment known to be productive of high achievement.

The head or chairman of any department or division who bears the title of "professor," either implied or conferred, as well as the associate professor, the assistant professor, and the instructor, would like to feel that his position carries with it certain responsibilities and duties and a given degree of authority, in keeping with his title, for administering his particular program. This feeling is human and is one of the roots from which spring imagination, initiative, ingenuity, drive, perseverance, and tolerance. The feeling of "belonging," of being an integral part in the functioning of the educational program of his college, of being appreciated, of being respected and of being rewarded for accomplishments is no less the desire of the teacher than it is the desire of the foundling to "belong," to be a part of a family, to be appreciated, to be loved, and to be rewarded for its achievements. Much of the developmental pattern of the foundling's behavior is greatly determined by its environment. Nurtured, it develops along desirable lines. Neglected or not directed, it seldom realizes its inherent potentialities. And so it is with the teacher, especially those who through great effort brought to their colleges educational prestige in newly won advanced degrees. Nurtured, they usually develop unsuspected abilities and make noteworthy contributions to the growth of the total life of the institution. Neglected or not correctly directed, they usually lose their initiative, their drive, their inspiration, their ambitions, and their ability to motivate.

In past years, and all too frequently and in too many colleges, departmental and divisional chairmen were given the title of "professor" with much the same connotation with which the term is attached to the name of the country school teacher. Department chairmen, in many institutions, were "heads" in name only, and except for the courses they taught, they shared very little in the duties and responsibilities attached to the title. Many of the duties which, by virtue

of office, should have been entirely or partly theirs were performed by the president, the dean, or the business manager. Their relationship to the administration was much the same as a boy's relationship to his father--although he occupied a certain position in the household, he was not yet mature and able to make decisions and conduct his affairs on an adult plane. Consequently, department chairmen in many Negro institutions were far from being satisfied with their lot. They had little or nothing to say about the personnel brought into their departments, they accepted with ineffective protests the woefully inadequate funds apportioned to them by the president without due regard to the basic needs of their departments, and they received few incentives for developing and maintaining initiative and a sense of loyalty and responsibility.

The 1930's brought a large harvest of young Ph.D.'s, for during these years no less than 68 Negroes received the doctorate degree in either the biological or the physical sciences, whereas all the prior years the number had been less than fifteen.* The vast majority of these Negro scholars, fresh from the great laboratories of the best of our American colleges and universities and inspired by some of our most brilliant investigators, returned South to former teaching positions or went South and obtained positions on the faculties of Negro colleges. And this influx of Negro scholars in the field of science occurred during a time when the country as a whole was in the throes of a financial crisis and when the presidents of colleges for Negro youth in particular were searching every possible reservoir for a few dollars with which to stave off what seemed to be sure financial collapse.

Upon this scene of financial desolation the young Negro scientist entered! Many of them were eager to continue the investigations which had won for them the coveted Ph.D. degree. Many had brought back with them protocols of experiments which when completed and published in a major scientific journal would bring them *and* their college some degree of recognition. Many of these scientists were zealous for doing a good job of teaching boys and girls in their chosen field and they had dreamed of the equipment, the supplies, and the animals which would make their work a joy. All they required was a small budget each year, a little time for experimentation, a few apt students and not too many poor ones, and a teaching load which would permit them to work effectively with their students. If they had been immature in their judgments and in the conduct of the business of their department and had not been accorded the privileges associated with their title prior to the earning of the doctorate degree, they now felt that they had "arrived" and that their crowning academic achievement should receive due and just recognition.

One may well imagine, then, the dismay of these teachers after they had entered upon their duties. In all instances, they found that the administration was quite pleased and proud of their achievement. It gave them *and* the college a great boost by proclaiming through the local and even the national Negro newspapers that their faculty was now graced with a Ph.D. The Ph.D., however, with few exceptions, was soon to find that his relationship to the administration was much the same as it was before he received his doctorate and that many of his desires, with reference to the development of his department and the pursuance of research, were to remain unfulfilled.

In spite of the fact that they found their situation unchanged or not to their liking, many of these teachers with advanced degrees exerted their best

*Data gathered from "Holders of Doctorates Among American Negroes" by Harry W. Green, Meador Publishing Company, Boston, 1946.

efforts in attempts to develop their courses along lines they knew were productive of good students, and they kept their enthusiasm for the instructional ideal and their zeal for research high by whatever artificial means they could find. They spent moneys from their own meager salaries for books and journals and paid their own expenses to scientific meetings.

What has been said about the status of many Ph.D.'s during past years can be applied with greater force to the status of the majority of the near-doctors and those teachers who acquired the master's degree. Like numerous of their academically more fortunate brothers, many of these instructors persevered despite the frequency with which they encountered handicaps and exerted every effort to produce the best students they could. The less hardy instructors, however, succumbed within a few years to the *laissez faire* attitude that permeates the atmosphere of too many institutions and they found themselves willy-nilly in the proverbial rut. Efforts to achieve high academic levels with the students diminished, the zeal for research and learning dimmed and the recently kindled fire of imagination, initiative, and determination to achieve was almost extinguished. It seemed now, for the most part, just a matter of "keeping school," drawing the monthly check and waiting for the June commencement.

The effect of the environment just described upon the development of good teachers and the maintenance of the will to persevere in teachers already possessed of excellent teaching skills need not be pointed out in any further lengthy discussion. It should be stated, however, that the failure of the majority of Negro science teachers to produce more adequately prepared students than they have may be attributed, in no small measure, to the unfavorable environment in which they labored.

The picture, however, is not complete; nor is it as one-sided as this first glimpse would indicate. Except in a few colleges in which the President entertained no criticisms or complaints, the teachers themselves shared equally with the administration the responsibility for the failure to provide the proper academic environment.

It is by no means true that all or even the majority of the teachers who earned advanced degrees did so because of a "love for knowledge" or that all or even the majority returned to their positions or entered upon new positions with enthusiasm, initiative, vision, and determination. In fact, a goodly number of them originally "drifted" into the teaching profession because of their failure to accomplish other objectives, an important one being the study of medicine; and the earning of the advanced degree was accomplished with much effort. Many of these teachers were only mediocre undergraduate students, who for various reasons, had received but mediocre instruction. Following the efforts incident to the winning of an advanced degree, they lapsed into a state of lethargic inertia, devoid of initiative and with little enthusiasm for training young minds.

Perhaps even more devastating, however, than this state of lethargy is the false sense of security in a "degree" displayed by so many of these teachers. Too many of them are of the opinion that they "have arrived"; that they "know it all." They have forgotten that the teacher is always and must always be the student. Too many of them are more concerned with social activities than with their classroom duties and responsibilities. They have failed to realize that the winning of an advanced degree is not an end in itself but simply the key which, if properly used, may unlock other treasures and lead to greater accomplishments. They have forgotten that responsibilities and authority are vested only in those worthy to bear such charges. They fear the knowledge of their

colleagues and the questionings of their students to work cooperatively and to be democratic in the classroom. Too many of them may be compared to the servant who buried his one talent. In short, there seem to be too few conscientious and consecrated teachers in too many Negro colleges.

Some of the preceding statements, with reference to the former status of many of the science teachers in Negro colleges, have not been documented by this Survey. The truth of the statements, nonetheless, will be recognized by those who have had intimate contact with the average Negro institution of higher learning. This Survey did, however, concern itself with the accumulation of data which throw light on the present status of department chairmen in the fifteen colleges visited and contribute information which may assist in partially explaining the failure of most of these colleges to produce a representative number of qualified premedical students.

2. *Organization of the Sciences in the Colleges Surveyed*

Information was secured on the organization of the teaching personnel in biology, chemistry, and physics into "departments" or "divisions," with the view of determining to what extent they were unified, especially with reference to the administration of a premedical curriculum. Of the fifteen schools represented, at least three of them have their science offerings organized on the divisional basis either with a permanent or a rotating chairman who is responsible for the administrative duties pertaining to the functioning of the three science units--biology, chemistry, and physics--with mathematics included. The remaining twelve institutions have their science areas and mathematics organized on the departmental basis with a "head" or chairman for each department. At no place in their catalogs do seven of the colleges designate department chairmen or the person in whom responsibility and authority are vested for the welfare and development of the departments. In the absence of the "chairman" or the "head" from the school it was unusual to find authority vested in some other member of the science faculty.

It is not the purpose of this Report to attempt a discussion of the relative merits of the two organizational plans, except, perhaps, to say that in the small college a more closely knitted premedical and science curriculum might be established and maintained on the divisional basis than on the departmental basis.

Data were obtained for giving a quantitative expression of the number of departmental or divisional meetings held each year in the several colleges for the purpose of making self-appraisals, formulating new programs, coordinating the work in the various science areas, and for discussing the problems and the progress of students. The general picture, with reference to organization, seems to be that there exists too little formal interchange of ideas within divisions or between the departments of biology, chemistry, and physics on the conduct of their respective or combined programs. Comments made by many chairmen give indication that much of the staff meeting is of an informal nature between department heads, and that most of the departments have no formally organized and directed program.

It is probable, therefore, that the absence of well organized divisions or departments and interchange of information and ideas on the conduct of a premedical program have contributed their share to the ineffectual efforts of science teachers to develop high-caliber students.

3. *Duties, Responsibilities, and Authorities of Chairmen*

With reference to a definition of duties and responsibilities of department chairmen, either in writing or in consultation with the president or the dean,

nineteen of thirty-three chairmen indicated that they were guided in the administration of their departments by an enumeration of duties and responsibilities, while the remaining fourteen indicated that no duties and responsibilities were defined. There was not always unanimity within a particular college with reference to the recognition of a chairmanship by formally conferring duties and responsibilities. Thus, the department chairman in each of nine departments of six of these institutions indicated that he had not been charged with duties and responsibilities as afore-mentioned, while one or more of his colleagues indicated that their duties and responsibilities had been defined either in writing or in consultation with the president or the dean. In four of the colleges all of the chairmen who responded to the question indicated that they were not guided in the performance of their duties nor had they any responsibilities that had emanated from the president or the dean, either in writing or in consultation. With respect to the possession of authority in addition to their responsibilities, only five responses were given. These indicated that the chairmen were vested with authority. However, the teachers in seven of the colleges who were consulted as "chairmen" were not listed as such in the bulletin or catalogue of their respective colleges. It appears that the connotation of "chairman" or "head" may be used in some of these institutions only on occasion and as may be deemed expedient.

Some documented natural outgrowths from the absence of defined duties, responsibilities, and authorities vested in departmental and divisional chairmen are found in the complete freedom with which individual instructors in certain of these colleges, quite apart from academic freedom, introduce courses, conduct classes or do not conduct them, grade papers or do not grade them, and deal with the scholastic problems of their students.

4. Appointment of Personnel

The chairman, who is directly responsible for the welfare of the instructional program in his department, should like to exercise his titled privilege in the selection of and recommendation for appointment of all new members of his staff. This is essential if he is to maintain continuity in his program, for he and only he knows the specific areas of specialized knowledge that the new appointee must possess if a particular job is to be done. Thus, recommendations regarding the appointment of staff members should originate with the men responsible for the programs, and all chairmen feel that the successful discharge of their duties is dependent upon securing the right man for the right job.

Data secured on appointment practices in the fifteen colleges surveyed indicate that of thirty-two chairmen who responded to the question, twenty-three had the *privilege* of indicating to the president or to the dean the qualifications of a prospective new appointee, while nine did not have this privilege. Fifteen chairmen out of twenty-nine who responded to the question indicated that the usual procedure in the appointment of staff members was for the president or the dean to ask them to look over the academic records of certain individuals whom they had in mind for the appointment. Six of nineteen chairmen who responded to the question indicated that appointments with which they had been quite dissatisfied had been made to their staffs. Nine of thirty-five chairmen who responded to the question indicated that they, at one time, had recommended that a staff member not be reappointed. Six of these recommendations were favorably acted upon. Four of thirty-one chairmen who responded to the question indicated that they had lost a staff member without having recommended the dismissal, and the action of which they did not approve.

The effect of appointment practices on the ability of departments to reach high levels of efficiency in their instructional programs is difficult to determine from the data gathered in this survey. It would seem, however, that purposes would be better served if in actual practice department chairmen shared to

a greater degree the responsibility of initially recommending personnel for their staffs. This responsibility, however, implies that the chairmen have an adequate roster of prospects from which recommendations may be made. Such information, except in the larger and better institutions, is not usually found in the possession of the average department chairman; more often it is the dean or the president who, through their numerous travels and their contacts with graduate schools, acquire this information. Also, since the bringing together of a faculty is ultimately one of the responsibilities of the president, many of them are reluctant to place this responsibility in the hands of persons whom they have reasons to believe are incapable of fulfilling the charge. The professional growth of the teacher, however, includes, among many other things, the acquisition of a wide acquaintanceship with individuals in his field, and this is usually acquired through attendance at scientific and other meetings. Thus, as a contribution to the professional growth of the teacher, it is one of the responsibilities of the administration to make it possible for not only chairmen but also other members of the staff as well to attend professional meetings. Through this medium and others, department chairmen may be led into greater proficiency which will win the respect and confidence of their superiors.

5. Induction of New Appointees and Exchange-Visits Between Staff Members

Since one of the major responsibilities of the chairman is to provide good and directed instruction for the students who pursue courses in his department or division, it is essential that he not only know or become familiar with the teaching competence of new appointees, but that he also provide the new appointees with definite and specific information regarding the objectives of the department. A new appointee may be brought to the faculty because of his recognized competence as a teacher, but even in this case, if there is to be uniformity of purpose and if the objectives of the division or department are to be implemented and realized, it is necessary that a clarification of these things be made, despite the long years of experience and the teaching competence of the new appointee. With reference to young appointees and those who do not have recognized competence as teachers, it is most certainly necessary for them to be properly inducted into the department if there is to be uniformity of purpose. It is no less essential that the chairman obtain first-hand information of the classroom performance of the young teacher or the teacher whose classroom competence is unknown, and this information can be secured only through class visitation. It is fully recognized that the practice of official or even unofficial visiting may develop in some new or old members of the staff a substantial psychological barrier, but this, with continued visitations, would be overcome. The teaching competence of an instructor cannot be determined by irregular or spasmodic unannounced visitations, for no teacher, regardless of his competence, can be expected to be at peak efficiency every hour or every day of his teaching program. However, after an extended period of observation, the evidence must certainly be in his favor if his retention on the staff is to be guaranteed.

Quite apart, however, from the official capacity with which a chairman should visit classes in the above circumstance, it would be wholesome for the department and mutually advantageous both to the visited and the visitor, if there were complete freedom in visiting and being visited by all the members of a department or a division. That is to say, the camaraderie within and between departments should be such that any staff member should feel free to visit his colleagues' classes at any time. This practice, undoubtedly, would be frowned upon by many individuals, and some might not, too gladly, lend themselves to it. The fact remains, however, that such an exchange of visits would permit each instructor in the division or department to see all the other instructors in action and would give each an opportunity to become familiar with teaching technics that might be useful to him. It would also appear that useful ends would be served if there were a free exchange of comments at the staff meetings concerning these visits, whereby instructors could be commended for their classroom

performance or spoken of conversely. Thus, a young instructor might well demonstrate an excellent technic in the teaching of a difficult topic, and he should be commended. On the other hand, one of the older instructors might well be doing an ineffective job, in which instance there should be no hesitancy in stating this fact. It is, again, recognized that such practices of exchange-visits and comments might be frowned upon by many instructors, but when it is considered that the departments and even the divisions in most Negro colleges are composed of only a handful of men and that they not only constitute a part of a small college family but are also intimate in their social and recreational activities, it is not too much to expect that they should also be intimate in the discharge of their common duties. The job of teaching cannot be done alone if the objectives of the members of the division or the department are one and the same. It also cannot be denied that such practices would inevitably lead to increased efficiency of each member and the development of a more coordinated department and subsequently a more productive program.

The following findings throw some light on present practices of chairmen in some of the areas just discussed. With reference to the induction of new staff members, some chairmen indicated that they employed more than one of the procedures tabulated below. This accounts for the apparent discrepancies between the total number of chairmen and the total number of responses.

1. Eighteen of twenty-eight chairmen indicated that they placed at the disposal of new members of their staff an outline of the courses to be taught which served for guidance in pointing up specific areas to be stressed.

2. Twelve of twenty-five chairmen who responded to the question indicated that they requested new appointees to submit outlines of the courses they were to teach.

3. Thirteen of twenty-six chairmen who responded to the question indicated that they left the selection of topics to be covered and areas to be stressed entirely up to new appointees and requested no formal outlines.

When polled with reference to their practice of visiting classes taught by new staff members in order to obtain first-hand information on their classroom performance, twenty of thirty chairmen responded that they did not visit classes. The numerous reasons given for not visiting classes are illuminating. They range from sheer negligence and the lack of authority to a statement that official class visitations are made by the registrar.

Recommendations

It is entirely conceivable that the intangibles discussed in this section, and on which some documentary evidence was obtained, have played a significant role in the failure of many Negro science teachers to work at peak efficiency and thus produce a larger number of adequately prepared premedical students than they have in past years. Administrators have not always given due recognition to the fact that the intangibles discussed in this section and others, not herein mentioned, are of cardinal importance in the life of the teacher. The following recommendations, therefore, are made in the hope that administrators and faculties alike will give profound consideration to means and methods for establishing as near the ideal academic environment as possible. It is recommended,

1. That the smaller colleges re-examine the organizational pattern of the sciences with the view of determining whether the divisional plan with a single chairman or a departmental plan with separate chairmen serves better the objectives of the science offerings.

2. That whether the sciences function as a division or as separate departments, they establish regular and formal meetings in order to prosecute more effectively their respective programs.

3. That, with reference to the administration of a premedical program and where the sciences exist as separate departments, there be interdepartmental meetings in order that all staff members may be apprised of things pertaining to the premedical student which might originate from a Committee on Premedical Education or from a premedical club or fraternity or from both.

4. That a formal and written report of the activities within each division or department be made to the academic dean at the close of each year. This report should not only recount the academic activities of each staff member, but should also set forth the desires of the department or division with reference to improvements and/or additions to physical facilities and personnel.

5. That department chairmen assume responsibility for seeing that a new appointee is properly inducted into the department, with reference to departmental objectives and practices, in an attempt to obtain uniformity of practices, where uniformity is desired, and within the college's framework of academic freedom.

6. That department and divisional faculties give serious consideration to the establishment of exchange-visits.

7. That administrators re-examine their administrative policies with reference to divisional and department chairmen. That where these policies have not been explicitly stated and formally made available to those concerned, consideration be given to the formal delegation of duties, responsibilities, and authorities to departmental and/or divisional chairmen.

8. That administrators re-examine the structure of their colleges and realize that the administration of the numerous units of its framework is no longer a one-man job; that for best performance and harmony between and within the several units of the college, responsibilities with authority must be given to those charged with the conduct of the academic affairs of the college as well as to those charged with the conduct of the fiscal affairs of the college.

It is strongly recommended to the faculties of the several colleges

9. That they re-examine their philosophies of education and their individual roles in their respective institutions in order to determine to what degree they are fulfilling the trusts which have been placed in them as teachers dedicated to the training and molding of young people; that those who have buried their talent recover it and use it for stimulating and inspiring the young minds in their charge who would like to look to them for guidance and motivation; that they realize that they are all working toward one and the same objective--the training of students and the assisting of students in finding the fullest expressions of their personalities--and hence must of necessity work together, not against each other, if the job is to be done; that they appreciate the fact that responsibilities and authority are placed only upon those who give evidence of the capacity to assume duties and to discharge them with thoroughness, discretion, and dispatch. For it is only through these attributes that they will be respected, that they will be charged with responsibilities, that they will be given authority, that they will come into the full stature of college teachers.

It is strongly recommended to the administrations of the several colleges

10. That the best possible methods for winning the wholehearted cooperation of faculties and staffs and their respect for and loyalty to the administration, and for assisting them in developing interest and initiative in their duties are to treat them as fellow-workers; to respect their rights; to consider them as personalties; to realize that they, as well as the employers, desire happiness and peace of mind on their jobs, and expect from their labors a degree of financial security in keeping with their productivity and usefulness; that if administrations were more sympathetic toward the problems of teaching and nonteaching personnel Negro education would progress at a pace never before witnessed.

6. *Science Instruction in the Colleges Surveyed*

The Survey attempted to accumulate data on the type of instruction, the availability of laboratory assistants, the type of examinations utilized and the availability of time and competent assistants for grading examination papers in the colleges surveyed. Opinions on the quality of science instruction in colleges solely for Negroes as compared with the quality of science instruction in mixed colleges were also obtained. It was hoped that from these data some conclusions could be drawn with reference to factors contributing to the present status of Negro premedical students, as afore-mentioned.

Findings and Interpretations

In response to the question "Are students in general 'carried along' and not failed in courses given in your department because of an 'unwritten' policy against flunking large numbers of students?", fifty-seven out of sixty-four instructors indicated that they did not "carry along" students and refrain from failing them because of an "Unwritten" policy against flunking large numbers of students. Seven instructors, representing five institutions (two private and three tax-supported) stated that such a policy did exist in their schools. Out of seven responses from one of the tax-supported schools, one was a frank "yes" and another was "some teachers do, but not in general." The top-ranking science personnel of a second tax-supported school, both in point of number of years of service and by virtue of holding the chairmanship of the science division, indicated that it *was* an unwritten policy that large numbers of students were not to be flunked when they failed to measure up to course requirements. In the third tax-supported school, one response out of three was a "yes" to this question. In the private schools, two responses out of two were "yes" in one institution and the single science instructor interviewed at the second institution gave "yes" as his response.

It is apparent, then, that in at least one-third of the schools, students *may* be given a higher grade than they actually earn, resulting in a false sense of achievement and placing the student at a decided disadvantage with reference to national examinations. Whether or not this policy in these five schools is general and is an administrative policy is not known, but the indication is clear that scholarship is not of prime importance.

Although statistics were not obtained on the problem of dishonesty on the part of students during examinations, it was ascertained that in some of the best of the surveyed colleges cheating was rampant with a minimal of corrective measures on the part of the faculties. In many instances, students are given high grades at the completion of a course in the full knowledge that they were not earned and that the students under no conceivable condition could pass the examination without cheating.

While this problem of dishonesty during examinations and other forms of moral disintegration are only indirectly related to the problem of instruction, they are nonetheless, of vital importance and are areas into which faculties should look with a searching eye. Colleges are responsible not only for the intellectual development of their charges, but also for their moral and spiritual guidance.

It may be concluded, therefore, that in some of the schools surveyed the students are not held rigidly to scholastic achievement and may be given an unearned passing grade. If such a policy exists in one-third of the schools not surveyed, it may very well play an important part in accounting for the low level of achievement of students on the Medical College Admission Test and on the Graduate Record Examination.

The science faculties were polled for their opinions on the possible influence of three factors on the academic achievements of their students. Although a number of instructors indicated that their students were eager to learn, were in college with a purpose and applied themselves to their studies without undue distractions, seventy-five percent of forty-eight instructors indicated that their students showed little enthusiasm for learning. They accounted for this apathy partially on the basis that the majority of the students felt that college was just a "winter resort" and that it was "the mode" to "go to college." Fifty-seven percent of fifty-nine instructors felt that their students indulged too heavily in social activities and that these, together with other extracurricular activities, prevented them from achievement in their studies. Fifty-seven percent of forty-seven instructors felt that the faculty and administration failed to motivate and inspire their students. It is significant that seven of ten deans who responded to the question indicated that they felt that faculty and administration failed to motivate and inspire their students.

Examinations on lecture and laboratory material are given regularly by most of the instructors, but there is some question as to the effectiveness of these examinations as teaching tools. The examination should be employed, among other things, as a means of correcting erroneous conceptions and strengthening weak ideas, but in order to be employed in these areas the instructor must have ample time in which to read through the papers and record worth-while comments on them. The data compiled on student clock-hours of work handled by the instructors in these institutions during 1947-1948 show conclusively that the majority of the instructors have little time for grading papers. With few exceptions, it is physically impossible for the instructors to perform adequately all of their duties, even working until late hours each night. Thus, seventy-one percent of fifty-nine instructors indicated that they did not have sufficient time for grading papers and fifty-seven percent of fifty-six instructors felt that many of their students failed to achieve a good foundation in laboratory courses because they lacked the time and the assistance necessary for giving good laboratory instruction. The consensus was that a much better job of teaching could be done if loads were made lighter or if adequate assistance were provided for handling the laboratory and grading examination papers and laboratory experiments.

The use of standardized examinations for measuring achievement in the various areas of biology, chemistry, and physics has been neglected by sixty-six percent of fifty-nine instructors. A number of teachers consistently employ the standardized test for final examinations in specific courses and hence are in a position to know how their students compare with the average student throughout the country.

With reference to instruction in physics, the overwhelming consensus was that a much more efficient instructional program could be provided with additional apparatus. In most instances, because only one or two units of a particular

apparatus is available, it is necessary to assign unusually large groups of students to perform an experiment and to assign different groups of students to different experiments for performance during one laboratory period. This practice, in itself, is probably entirely in keeping with good laboratory procedures in physics provided there is a sufficient number of laboratories and assistants for directing the work on each experiment. It is frequently necessary, during the course of a laboratory period, to direct the attention of the students to some particular problem connected with an experiment. It is frequently necessary to go through certain technics or calculations with the class as a whole. These procedures cannot be utilized in a laboratory where the students are working on different experiments. Also, all too often, because of the lack of time and assistants, students are allowed to run through an experiment as an isolated phenomenon quite apart from its relationship to lecture material and application. Good pedagogy requires that the significance of an experiment be brought to light, and this is usually accomplished through classroom discussion immediately following the performance of the experiment. Again, this is impossible in a classroom where several experiments are performed during a single period.

At least two-thirds of the schools surveyed indicated that their physics equipment was adequate in the several areas of physics, but this is interpreted, with few exceptions, as indicating adequacy with reference to minimum equipment.

Thirty-three of forty-eight instructors felt that the courses given in their departments were as well planned and organized as the same courses they followed as undergraduate students in institutions not solely for Negroes, but fifteen of the forty-eight felt that their courses were inferior. These fifteen instructors represent nine schools. In response to questions concerned with factors contributory to the unsatisfactory organization of their courses, the consensus was that heavy teaching loads and other school duties made it impossible or very difficult for them to prepare their courses properly. Eighteen of forty-four instructors felt that their courses were not as well presented from the standpoint of lecture demonstrations and visual aids as the same courses they had pursued as undergraduates. The reasons given were insufficient time for the preparation of demonstrations and lack of apparatus and visual aids. *Twenty-eight of forty-one instructors indicated that they either consciously or subconsciously expected less achievement from their students than was expected from the students in the courses they pursued as undergraduates.*

These replies indicate that regardless of the high ideals and expectations with which some of the teachers entered upon their duties, many of them, because of numerous factors fall into the proverbial rut and simply "keep school."

Recommendations

It seems fairly certain from the objective evidence gathered that, although of considerable importance, inadequacies in equipment are not of prime concern in explaining the low level of achievement of premedical students. Some of the more subtle and important factors are to be found in the type of academic environment in which the teachers and students perform and in the attitude toward student achievement held by teachers and administration alike. An elevation of student achievement, therefore, will not derive solely from an improvement in physical facilities for the sciences. The more important problem appears to be a strengthening of the institutional policy toward academic achievement and creation of an atmosphere and working conditions conducive to good teaching and effective learning. The following recommendations are offered toward the fulfillment of these objectives:

1. That the policy of the institution with reference to academic achievement of its students be clearly stated, and that instructors be charged specifically with the responsibility of maintaining this policy.

2. That administrators re-examine, in the light of student-teacher ratio, the time available to teachers for reading and grading reports and examination papers, and that where needed the necessary assistance or conditions be provided them for accomplishing this and other duties pertaining to the instructional program with a high degree of thoroughness.

3. That a greater use be made of standardized examinations in all areas, wherever feasible and available in order to obtain a comparative measurement of student achievement.

Inasmuch as over sixty-seven percent of the teachers interviewed indicated that they either consciously or subconsciously expected less achievement from their students than was expected from the students in the courses they pursued as undergraduates, it is strongly recommended

4. That the faculties of the individual colleges take whatever steps are necessary to correct this unwholesome, stultifying, and pernicious attitude.

7. *Teaching Loads*

Findings and Interpretations

The factor of the range of subjects taught, apart from the load, may have an important bearing upon the organization and presentation of the courses taught by the men in these institutions, and a few of them offered comments on this point. Several instructors stated, in defense of their admission that the courses they taught were inferior to those they had pursued as undergraduates, that teaching assignments frequently include courses in which the teacher has little proficiency as well as those which are his chief interest and in which he is competent. Freshman courses were said to be handled better than many of the advanced courses.

A not uncommon practice in some schools is that of having a teacher give a course out of his field. During the war years this was a necessary expedient in many schools and at the present time, because of the loss of teachers and inability to replace them, administrators have no alternative but to request an instructor to give a course in a field not his specialty. The practice, however, regardless of the circumstances occasioning it, is one which does a great injustice to the student and to the instructor. The student receives inferior instruction and the instructor gains the disrespect of his students for not knowing his subject. Even the dullest student knows when the teacher is not delivering the goods! An instructor who teaches biology, for instance, is called upon to give the course in organic chemistry. Even though he may have done the minor for his doctorate in organic chemistry, the single fact that he has not constantly taught the course practically disqualifies him as a competent teacher of that particular subject. He does not possess the teaching technics peculiar to the subject, he does not *know* the material, and his instructional worth in the laboratory is less than that of a good undergraduate assistant, for the latter at least is familiar with the details of the experiments.

Perhaps it is a high compliment to the instructors in the schools surveyed to record that some of them give as many as six different courses per year. At the same time, however, it cannot be denied that the efficiency of the teacher and the quality of his courses are jeopardized when his efforts are spread so thinly. The biology teacher who, for instance, gives during one academic year courses in general zoology, comparative anatomy, embryology, genetics, and physiology cannot possibly be expected to do as good a job as the teacher who has to prepare for only two or three of these courses. Some of his courses will be good, but others will suffer from lack of organization, subject-matter content, and/or clarity in presentation.

The teaching load of each instructor in the departments of biology, chemistry, and physics of the colleges surveyed was calculated in terms of student clock-hours. The number of different subjects each instructor taught was also determined. It was found that of ninety-nine instructors, forty-two of them gave four or more different courses during the 1947-1948 school term. In some instances, instructors gave courses in more than one department, other than physics and mathematics, and there were some who instructed in widely different fields, such as, for instance, chemistry and education and biology and elementary German. Of 123 instructors, it was determined that fifty-eight, or forty-seven percent, of this number were instructionally responsible for more than one hundred students. One hundred and three of these instructors, or approximately eighty-four percent of them, instructed more than fifty students. In terms of clock-hours, fifty-five of 116 instructors carried a student clock-hour load greater than 500. This is 47.4% of the total number of teaching loads calculated. The maximum numbers of students taught and the maximum student clock hours handled by instructors in the various schools are quite revealing. Thus, over eight and one-half percent of the science instructors in the fifteen schools surveyed handled more than 200 students each. Over twenty-five percent of the instructors had student clock-hour loads in excess of 700 hours per week. Two examples will suffice to indicate the instructional load carried by some of these teachers and to point up their claim that efficient programs are impossible under such conditions. In one of the fifteen institutions, a single teacher was responsible for instructing 165 students in general biology, eighty-eight students in comparative anatomy, and eighteen students in the principles of heredity. In this same school, the enrollment in general inorganic chemistry was ninety-one students, and the course in organic chemistry had an enrollment of seventy-five students. Each of these courses was given by a single instructor. In a second institution the enrollment in general chemistry was 403 students, organic chemistry, 103 students; comparative anatomy, 118 students; embryology, 70 students; and general physics, 211 students.

These findings undoubtedly explain to a great extent the failure of teachers to bring their students to a desirable level of achievement. The job of course preparation is never ended, and when this involves a number of highly specialized courses, it is usually the exception to find all of them organized and presented with the same degree of effectiveness. Coupled with this necessity of handling, during one academic term, several highly specialized courses, the teachers in the colleges surveyed carry an unusually high student clock-hour load. Laboratory supervision itself is difficult with these large numbers of students, and with this the additional handicap of insufficient and inadequate equipment and lack of physical space for laboratory work must be considered. It may be concluded, therefore, that insofar as the science areas are concerned, a great part of the responsibility for the low level of achievement of premedical students may be attributed, certainly at the present time, to overcrowded laboratories, inadequate and insufficient equipment, insufficient time for the preparation of courses on the part of teachers and a shockingly high student-teacher ratio. Under these conditions, it is not to be expected that teachers can give the type of instruction which leads to high achievement.

Recommendations

Any recommendations concerning teaching loads would obviously overlap some already made with reference to personnel and enrollment. It is again pointed out that rigid selection of students for the premedical program will not significantly decrease the number of students enrolled in the science departments. Colleges, therefore, will still face the problem of providing adequate facilities and personnel for the large number of students they have enrolled and this includes the students in all areas of instruction no less than the premedical students.

8. Turnover of Science Personnel

Findings and Interpretations

A detailed study of the turnover in science and mathematics personnel for the academic years 1930-1931 through 1947-1948 was made. These tabulations were supplemented with information obtained from department chairmen with reference to the extent to which they felt faculty turnover contributed to their failure to achieve the objectives of their departments.

The war years witnessed extensive changes in the personnel of all institutions. Following the end of hostilities, many colleges suffered additional losses due to resignations of personnel who accepted higher paying positions in other institutions. Some of these colleges have been fortunate in retaining their top-ranking personnel over long periods of years, but the majority of them have not been so fortunate. Thus, of 204 science teachers retained by the fifteen institutions in 1948, thirty-eight of them (18.6%) had been on their respective staffs since 1930; fifty-seven of them (27.9%) had been on their respective staffs since 1938; sixty-seven of them (32.9%) had been on their respective staffs since 1941; and, with the exception of one college from which data were not obtained, only seventy-one of them (34.8%) had been on their respective staffs since 1945.

During the eighteen-year period between the academic years 1930-1931 through 1947-1948, some of these fifteen colleges used as many as fifty different science teachers in science areas which normally were staffed with from ten to twelve instructors in 1938. Certain others of these surveyed colleges with science staffs of from five to eight members in 1938 used from thirty to thirty-three different teachers during this eighteen-year period. For the ten-year period between 1938-1939 through 1947-1948, as many as forty-four different teachers were used in the science areas by one of the surveyed colleges. The turnover since 1945 in at least two-thirds of the colleges surveyed has been in excess of fifty-five percent. In some of the colleges the turnover has been as high as eighty-five percent.

Despite the fact that those colleges which have been able to maintain a relatively stable faculty over the years have not produced the expected number of premedical students who reached the fiftieth percentile on medical aptitude tests and despite the fact that other colleges that have not been able to maintain stable faculties have produced some good students, it cannot be denied that the smooth functioning of a program or of a curriculum depends upon a minimum of faculty turnover. Departments or divisions with heavy turnovers in instructional personnel cannot be expected to prosecute effectively any program.

The departmental and the divisional chairmen of the colleges visited were questioned with reference to the stability of their teaching staffs, exclusive of teachers with the rank of instructor. Fourteen of thirty-one chairmen who responded to the question indicated that they had not been able to maintain intact staffs. Eleven of these fourteen chairmen ascribed their failure to achieve departmental or divisional goals in part to this turnover in their staffs. Of seventeen chairmen who had been able to maintain relatively stable staffs and yet had been unable to achieve their objectives, all of them ascribed this failure to heavy teaching loads with little time for the adequate preparation of course material, to insufficient equipment, to poor student material, or to a combination of two or more of these and other factors.

Recommendations

Recommendations with reference to stabilization of teaching staffs obviously would be intimately connected with ranks, salary schedules, and opportunities for

professional growth. If a teacher has rank in keeping with his training, competence and service, has a salary not too much out of line with the salaries paid by other institutions, is accorded the opportunities for professional growth that he should rightfully expect from the college, and is able to make some progress from year to year with the development of his program, there would be no difficulty experienced in maintaining intact faculties. Teachers, like other individuals, and especially during these years, are faced with the problem of maintaining their standard of living. It is not to be expected, therefore, that many teachers would decline an offer from another institution when the salary differential is anywhere from $2,600 to $3,200. It is hoped, then, that those colleges which are in a position to make a significant contribution in the field of premedical education will be able to obtain the funds that are necessary for not only retaining and adding top-flight personnel to their faculties through the payment of increased salaries, but that they will also make adequate provisions for the professional growth of their faculty members.

9. Opportunities for Professional Growth

Findings and Interpretations

Perhaps one of the most serious grievances of the Negro teacher is his indictment of the administration for its failure to provide for his professional growth, while, at the same time, expecting his continued growth in competence and, in many instances, a display of scholarly activity. Since one of the criteria by which the fitness of an institution for accreditation is determined is its provision of opportunities for the professional growth of its personnel, an effort was made to discover to what extent and in what areas the surveyed schools met this criterion.

With reference to sabbatical leave or, in lieu of sabbatical leave, a reduction of the teaching load in order to provide time for scholarly activity, all of the department chairmen in nine of the fifteen institutions indicated that no provisions were provided for any type of sabbatical leave or for a reduction in their teaching load in order for them to pursue some scholarly activity.

With reference to recognizing and fostering research as an aid to professional growth and competence, eleven department chairmen out of thirty-one, representing seven institutions, indicated that their institution did recognize and foster research. From responses to other questions these affirmative answers were interpreted in terms of the provision of funds for research, either directly by the institutions or through the institutions from outside sources, such as the Carnegie Grants-in-Aid. However, unanimity in the responses of the chairmen in a given school was frequently absent. Thus, as one example, two of three chairmen in each of two institutions indicated that research was not recognized and fostered, while one chairman in each of the institutions stated that research was recognized and fostered. Although the questions asked were explicitly stated, these disagreements in response could indicate that some departments did not avail themselves of funds that could have been utilized for research purposes. Twenty-two chairmen, representing thirteen of the institutions, indicated that it was possible for them to use departmental funds for purchasing materials and not-too-expensive equipment for research purposes. Seventeen chairmen indicated that they were then engaged in research while twelve indicated that they were not engaged in any type of research activity. With very few exceptions, those chairmen who were engaged in research indicated that they were handicapped in their work by one or more of the following: (1) heavy teaching loads; (2) inadequate space or lack of permanent space for their work; (3) inadequate library holdings; (4) inadequate equipment and insufficient materials for the prosecution of their research; and (5) lack of assistants for relieving them of many time-consuming and unprofitable activities about the laboratory. Those not engaged in research gave as their reason, in most instances, the utter futility of attempting research under the conditions in which they worked.

Adequate office space was at a premium in most of the colleges. In many instances, four and five teachers occupied a single small office while in other instances no office space at all was available. The majority of the teachers in these colleges, therefore, do not have the privacy required for quiet reading, reflecting and planning, and for discussing with students their various problems.

One very important means for the professional growth of the teacher is the provision of funds for meeting expenses incident to attendance at annual scientific meetings. The college as well as the teacher profits from this outlay of funds; for the teacher, whether officially or not, represents his college.

Eleven of the surveyed colleges provide travel funds in part or in whole for members of the science faculty. Four of the colleges do not provide such funds.

Recommendation

It would appear that the general tone of a college's academic life could be pitched to a higher level if class loads in terms of the actual number of students taught by each instructor were reduced to such an extent as to allow some scholarly activity on the part of teachers during the regular school year. If, coupled with this, the administration also actually fostered scholarly activity among its faculty, it would undoubtedly be reflected in a more highly motivated and inspired student body. Properly motivated and inspired, the problem of student achievement would be reduced to a minimum.

It is recommended, therefore,

1. That those colleges which do not provide adequately for the professional growth of their teachers (a) make provisions for some type of sabbatical leave; (b) include in the science budgets funds to cover the expenses of those teachers granted leave to attend scientific meetings; and (c) take whatever steps are necessary to have faculty members qualify themselves for research grants which might be provided by the college or by some outside agency.

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